Operation Flood and the Voluntary Sector

A Study of Tribal Dairy Cooperatives in South Gujarat

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This book is based on the experience of the Behavioural Science Centre (BSC), a non-governmental agency operating from Ahmedabad. Its work with some other NGOs in the support of tribal dairy cooperatives in South Gujarat was undertaken within the context of the Operation Flood programme. Through the concrete experience of the Behavioural Science Centre, the book focusses on the role that NGOs can play in enabling a programme like Operation Flood to be truly developmental. The study examines two co-operative models--an extensive-centralised one and an intensive-decentralised one. It concludes that the latter has proved economically more viable and has also enabled the poor to increase their organisational power. However, while the role of the NGOs has been a positive one, a lot still needs to be done in order to increase the say of the primary tribal cooperatives at the district dairy level.

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Preface

This book is an articulated expression of the philosophy underlying the work of the Behavioural Science Centre(BSC), a non-government organisation devoted to development. This philosophy rests on two basic tenets, one relating to the organisation and the other to the people for whom the organisation exists. At the organisational level it aims at striking a balance between thought and action, at a blend of activist operation and reflective research. A total involvement with the day-to-day situations of the people on the one hand, and a periodic withdrawal to generate objective reflections on those situations on the other are seen as crucially complementary if the work is to be linked meaningfully with the country at large. At the level of the people among whom it works, the BSC believes that its main role is to create relevant and sustainable socio-economic organisations. The BSC clearly sees its intervention as time-bound and its eventual withdrawal from these structures is an integral part of its involvement.

That this philosophy has guided the methodology of the present study is borne out by the fact that it is an attempt at *participatory* research. Thus this book is the outcome of a combined effort by the BSC's Research and Training Wing, its Educational Wing, and the tribal population of South Gujarat. The design used to evaluate the social and economic impact of tribal co-operatives emerged from a long and continuous interaction between BSC personnel and tribal village workers. This instrument of evaluation was perfected and given final shape by the Research and Training Wing. Data collection was undertaken by the officials of the various co-operative offices. It must be noted that the data generated by this evaluation was continuously available to the village workers and thereby served as an educational input. Thus, this book in its final form articulates the results of a complex interaction and provides a documentary of the on-going developmental process.

Finally, it must also be noted that this study addresses itself to the National Dairy Development Board (NDDB) and its dairy structure for the simple reason that the NDDB's policies form the backdrop to the dialogue

between and the BSC and the tribals. It would be folly to assume that it could be otherwise, considering the pervasive and large role that this organisation plays in dairy development.

The number of people who contributed to this book is legion. We must, however, make special mention of some of them. Three people, now no longer with the BSC, invested a great deal of time and energy in initiating the process: they are J.M. Heredero, P.T. Contractor, and Gagan Sethi. Prasad Matthew Chacko was responsible for co-ordinating the data collection with the field workers, W.U. Vasava and K.T. Vasava.

Hema Ramani's analytical skills were very helpful in preparing the first draft of this study. Tridip Dave prepared the material for the Introduction.

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Introduction

All revolutions, red and green and white, have become the subject of acrimonious debate over the last 15 years. The National Dairy Development Board (NDDB) responsible for the formulation and implementation of the various phases of Operation Flood (OF) has remained the critical axis around which this controversy has revolved. Given the fact that the NDDB has been the main force in ushering in the white revolution (Mascarenhas 1988: 92), it is not surprising that both its detractors and supporters have placed NDDB at the centre of the debate. This in no way means that the controversy has been mainly institution-oriented rather than issue-centred. On the contrary, the main spin-off from this debate has been the highlighting of the assumptions underlying different approaches and models of development. The clarification of the nature of development effected by this highlighting more than offsets the heart-burn generated among the participants of this debate.

The issues involved in the OF controversy are varied and complex. Given the particular focus of this study which deals with the actual milk-producer rather than the NDDB, it is necessary at the outset to indicate the general issues *not* dealt with in this book.

We might begin with the international dimension of OF. It is well-known that the programme has been subsidised with imported Skimmed Milk Powder (SMP) and Butter Oil (BO). The appropriateness of using commodity-aid for development has been widely questioned (Baviskar and George 1988: A-37). Apart from the dubious motivation of the EEC countries in undertaking this programme (Baviskar and George 1985: 1550), critics have also questioned the accompanying dependence on foreign technology (Singh 1985: 1227), a dependence which has induced qualitative changes in Indian dairy-farming, changes which in turn reinforce the level of dependence on donor countries. Finally, unlike grain aid, milk aid has distorted domestic prices, making it expensive for the rural poor (Singh 1985: 1228; Crotty 1980: 186; Dorsten 1985: 22).

The second controversial issue is cross-breeding of indigenous animals with exotic breeds, a practice formally introduced in OF II (NDDB 1978; George 1985: 84-85). The defenders of this strategy argue that, given the rapid rate of population growth in India, the only way to maintain the present levels of milk-consumption is to increase the productivity of milch animals through cross-breeding (Guha 1980: 796). Another rather more cogent argument advanced by them claims that cross-breeding will not alter fundamentally the distribution of scarce fodder resources. This is because the programme will permit the existing population of low-yielding animals to continue producing low quantities of milk as well as draught power on a diet of crop residues and natural herbage. At the same time, the small proportion of the bovine population which is cross-bred will convert scarce feeds (green fodder and concentrates) into milk with greater efficiency than the local animals (Shah 1980: 1411). Those who oppose cross-breeding point out the negative distributional impact of the programme because (i) it will benefit the large farmers, (ii) the needs of cross-bred cattle will deprive the poor of cheaper millet and inferior pulses (Rajapurohit 1979: A-23). These critics further argue that the introduction of high-yielding breeds ignores altogether the dual function of bovines in India: milk-yield and draught power. The foreign breeds are meant mainly for dairy-farming; when used for draught purposes in India they do not perform as well as the indigenous oxen and their morbidity and mortality rates are comparatively higher (Rajapurohit 1979: A-22). The defenders of cross-breeding ignore this negative aspect bent as they are on regarding the Indian milch animal as the exact replica of its foreign counterpart. If cross-breeding has succeeded in Kerala it is due to special conditions not obtaining everywhere (Nair 1982: A-16).

The third controversial issue is the impact of OF on the rural and urban consumption of milk, a matter which has been widely discussed in the literature from various angles. Seeing the importance of milk as a nutrient depends on whether we consider it an important source of protein in people's diet. Critics of OF argue that milk is not required to make up a balanced diet since there are other cheaper sources of protein (Huria and Acharya 1980: 1932); hence, they maintain, it is more appropriate to speak of milk as a "cash" rather than as a "food" crop (George 1988: A-37). OF critics have brought forward yet another argument: the impact of OF discriminates against the nutritional standards of the urban and the rural population. A study in Kerala shows that about 60 per cent of total milk in urban areas and 70 per cent in rural areas is consumed by the top 30 per cent

of their respective population (Nair 1979: A-34). There is another reason for the worsening of the nutritional standards of the poor. The incentive to sell milk compels many small farmers and landless labourers to reduce drastically their home consumption of milk, affecting mainly the nutritional standards of their children (Dorsten 1985: 31; Sambrani 1981).

This view is challenged by data adduced to prove that the establishment of milk cooperatives has not resulted in a lower per capita consumption of milk (Acharya and Huria 1986: 1654). On the contrary, a study conducted in Karnataka shows that in households of villages with dairy development programmes, the food and milk intakes are higher than those of households located in villages without them. This conclusion covers the intakes of small farmers and agricultural labourers (Bowonder 1987: A-8, A-9). The methodology of these studies and the validity of their conclusions have not gone unchallenged (George 1987: 1660).

The fourth controversial issue deals with the characteristics of the new dairy technology implicit in OF. The adoption of this new technology involves a total change affecting the various activities of the dairy industry, from breeding and processing to marketing and distribution. NDDB maintains that this technology is scale-neutral at the level of the producer but follows the economics of scale at the level of processing and marketing. It is further asserted that the vertical integration of the industry—a corollary embodied in this technology—is necessary to increase the value added of the final product for the benefit of the primary producers. The issue of scale-neutrality at the producer's level is intimately linked with the issue of cross-breeding and the required increase in concentrate feed. The former has been discussed above and the latter will be dealt with in the ensuing chapters. A new production technology may also refer to a new set of activities related to animal-rearing that increases the productivity of the indigenous buffalo. This modest but realistic understanding of technological innovation introduced by OF is of crucial importance in evaluating the developmental impact of OF. As regards the processing and marketing aspects of the new technology, their suitability and relevance have not gone unchallenged (Dorsten 1985: 56-58; Nair 1980: 448), and various alternative technologies supposedly more appropriate to India have been suggested (Doornbos 1985: 23-26).

We turn now to the performance of NDDB as a "strategic institution" for development. The concept of strategic institutions refers to those

organisations that from a social point of view "contribute directly and significantly to the major long-term objectives of a society" (Khandwalla 1988: 22). The "apex developmental organisations" of a sector are mainly government-owned and are officially responsible for achieving a new national objective; the Planning Commission is an example of such an organisation. The "spearhead strategic organisations" are characterised by their particular mission in breaking new ground; "they are often large but not necessarily dominant in their respective sectors, and they tend to play a spearheading or pioneering rather than a directive role in these sectors" (Khandwalla 1988: 29). The NDDB is cited as a typical example. The third type, called "human growth organisations," are generally built up around a highly motivated individual or group and dedicated to mobilising the poor and to social change. SEWA and TILONIA are cited as examples. The suggestion that NDDB be regarded as a strategic organisation has been questioned. Without denying the role played by NDDB in providing an organisational model of development where corruption and nepotism have been avoided, S.George is critical of the shifting and, at times, contradictory stands taken by NDDB in order to avoid a clear-cut commitment on various critical issues (George 1988: 68; Baviskar and George 1988: A-35).

Finally, this book does not deal directly with the effect of OF on women. Some view OF as an effective instrument in helping women to be drawn more into productive economic activities, since they are ultimately responsible for carrying on the operations connected with dairy farming. In addition they acquire new knowledge and skills in animal health-care which are useful in other areas of development like human health and family planning (Dorsten 1985: 43). Critics point out that the net effect on rural women is not clearly positive. They argue that the commercialisation of dairy farming may eventually result in the removal of dairying from the realm of women's labour. As has happened in other economic spheres, the moment an activity becomes commercially profitable, it tends to be taken over by men. One could question the reasons for which women willingly take up this activity and attribute it to the poverty and drudgery in which they are submerged: "given the choice between walking for hours each day to make out a meagre living and the possibility of an income within the home, with less expenditure of energy and the increased possibility of spending more time on child care and other household chores, the latter is more preferable" (Anand and Savara 1985: 157). The most serious criticism of OF is that rural women's workload may increase i.e. rather than setting her free to choose between economic activities, dairy farming

would only impose yet another responsibility to an already over-burdened working day, and still exclude her from the management of this enterprise (Dorsten 1985: 46). Unless specific efforts are made to include them in the management of existing cooperatives, or to start new women's cooperatives, they stand no chance of shaping the direction of the white revolution. This hardly comes as a surprise when one remembers with sadness how little they were allowed to shape the green and red revolutions.

Having listed the controversial areas in the OF debate which are not directly touched upon in this book, we turn our attention now to the two issues that constitute the central theme of this study. The first deals with the developmental character of OF, and the second with the role played by Non-Government Development Organisations (NGDO) in it. The former critically analyses the claims made by NDDB that OF is a relevant and successful development programme, and the latter examines the appropriateness of the involvement of the NGDOs in this programme. The two issues are distinct, though the discussion of the second depends crucially on the conclusion emerging from the first.

The claim has repeatedly been made that OF is a successful development programme. We understand this statement as referring to the positive changes OF brings into the lives of the rural poor (Acharya and Huria 1986: 1652; Dorsten 1985: 13-15). More specifically, we examine the developmental impact of transforming the rural poor into efficient milk-producers under the OF pattern of dairy-farming.

Such an analysis demands that we establish the criteria that determine whether a project or intervention is developmental or otherwise. In stating the following three criteria we are concerned with emphasising the *sine qua non* conditions rather than enumerating all the possible characteristics of development.

A development programme must, first, result in a sustainable increase in the economic independence of the poor. Second, it must strengthen the cohesion of a community by reducing rather than increasing inequalities. Third, it must create or strengthen the organisational power of the community. We examine now the implications of each criterion.

While greater *economic independence* may be attained by the rural poor in many ways, in this study we concentrate on those which are directly

related to the activity of milk production. Attention is first focused on the effects of OF on income and employment, and on changes in milk productivity. If these changes are positive, and if milk production can be generally assumed to be a complementary rather than a competitive activity, then the economic independence of the rural milk producers may be said to have improved. Second, economic independence rests on the technological transformation of a productive activity, since changes in productivity are usually accompanied by the successful creation, adaptation, or adoption of a new technology. Third, no lasting economic independence occurs when an economic activity exerts a negative influence on the precarious balance of the eco-system prevailing in most rural areas.

The second criterion, as mentioned above, states the need to reduce inequalities. Social considerations of this kind are crucial in evaluating the developmental nature of a programme like OF. One of the main reasons for the disastrous effects of many programmes is that their beneficiaries are individual households rather than the community as a whole. Given the fact that the social fabric of rural life is woven around kinship or caste groups, an individual-oriented programme usually generates an endless chain of jealousies and factional divisions, and ultimately destroys the fragile unity of the poor. In addition, a true developmental programme must not be biased in favour of the rich, and it should, as far as possible, benefit the most vulnerable sections of the rural poor.

The third criterion states that, given the structural nature of poverty (Franco 1988: 35-85), that is, the poverty generated and perpetuated by a socio-economic structure characterised by highly unequal power relations, a true developmental programme must necessarily aim at empowering the poor. One of the most effective ways of achieving this goal is to provide them with an organisation (Mehta 1988: 174-185; Heredero 1989). Organisational power entails the acquisition of new and varied skills, the development of a set of democratic rules and procedures that ensure the participation of all, a consequent rise in their bargaining power *vis-a-vis* the dominant groups, and finally, the emergence of a new ethos, a new collective meaning, that effectively counteracts the old ideology of servitude and oppression.

To the extent therefore to which OF makes the rural milk producers economically more independent, reduces inequality, fosters groupal cohesion and identity, and increases their organisational power, we can

conclude that OF is a successful developmental programme. On the other hand, if our study shows that OF fails to meet the above criteria, we may infer that it is not.

Before examining the OF debate in the light of these criteria, it is necessary to provide the context in which this study has been carried out.

One of the main goals of OF through its successive phases has been to replicate the Anand-pattern of milk cooperatives all over the country. This effort aims at creating a national milk grid, a network of central dairies buying milk from rural milk producers and processing it into milk of different grades and milk-derived products to be sold in urban areas (Terhal 1986: 3). Gujarat has been the success story of the cooperative dairy industry. This may be partly attributed to the high share of OF funds invested in the state (Shah 1986: 5). Some critics have even spoken of a regional bias (Singh and Sharma 1981: A-25).

Claims have also been made as to the potential benefits of this programme for the most deprived sections of rural society. To test the validity of these claims this book has chosen some tribal milk cooperative societies affiliated to SUMUL dairy in Surat in South Gujarat. Chapter 1 outlines the main socio-economic characteristics of these communities and brings out the intensity of economic and social deprivation to which they are subjected. The tragedy is that the poverty of these tribal communities stands out more starkly in the face of the rapid agricultural development experienced by the surrounding fertile plains. We believe that no better context than this could have been chosen to test the developmental character of OF.

We turn now to that part of the OF debate which touches the three criteria mentioned above and indicate where in this book our position on these matters is clarified.

The economic benefits received by the milk producers have been emphasised by many. Summing up much of the debate on this point, Acharya and Huria observe that, unlike other development programmes, OF benefits the rural population because (i) it recognises the fact that rural production of commodities, perishable or otherwise, needs a strong marketing channel; (ii) it ensures a better price to milk producers thereby providing a stimulus for growth; (iii) it introduces a new technology and ensures through a well-established infrastructure that such technology is equally available to all

producers avoiding class disparities; (iv) it employs modern management techniques for effective monitoring and coordination (Acharya and Huria 1986: 1652). If we add to this the fact that OF provides subsidised inputs like feed and animal health-care (Singh and Kelley 1981), and access to modern processing techniques, enabling the producers to sell milk during the lean as well as the flush season, then it follows that OF has generally had a positive impact on incomes. An adverse critic like Dorsten performs some dubious logical somersaults to disprove the evidence (Dorsten 1985: 32-33). Not taking account for the moment of the distributional aspect, it is difficult to deny that milk producers have, on an average, increased their incomes.

Incomes rise because, on the one hand, dairy-farming provides employment to surplus labour without alternative economic occupation (Acharya and Huria 1986: 1652), and, on the other, OF increases milk output and productivity. The latter may occur for a number of reasons: the number of households engaged in rearing animals increases, the number of animals per household may also rise, better and more inputs are available, and the proportion of animals in milk rises. Chapter 4 (Sections 4.4 - 4.6) examines the evidence for income-rise and analyses the reasons for its occurrence.

The transformation of existing technology plays a decisive role in achieving economic independence. The discussion of the appropriateness of adopting the new dairy technology implicit in OF deals mainly with the advantages of a technology supposed to be scale-neutral at the milk producer's level and subject to economies of scale at the processing and marketing levels. Cross-breeding forms an important component of the technological package offered by OF. The present study, as mentioned earlier, does not deal with these two aspects, but rather, it understands technology as a new set of activities related to the breeding of buffaloes and to the sale of milk to SUMUL. This understanding of technology is relevant in the context of a tribal milk producer who has adopted buffalo-rearing for the first time. Chapter 9 defines the concept of technology used in this study and analyses its degree of acceptance among tribals and its differential absorption rates for various economic groups or classes.

At this stage it may be useful to remember that tribals in South Gujarat have traditionally been rearing cows for milk and draught purposes. The adoption of dairy-farming under OF has introduced the buffalo exclusively

for the sale of milk to SUMUL because of its greater fat content. Cow's milk still continues to be used for home consumption. Since OF does not envisage cross-breeding of buffaloes this aspect of OF's technology is irrelevant to our context.

The pivotal role of the buffalo in the new dairy technology among tribals is part of a common trend discernible in the country since the sixties. K.N. Nair, for example, points out that from 1961-1982 the share of buffalo milk in total milk production has increased from 54 to 60 per cent, while the share of cow's milk has declined from 43 to 35 per cent. This is due to the fact that the female buffalo population has been increasing at a faster rate than the female cattle population in general. During the period 1961-77 the former increased by about 24 per cent while the latter rose by only 6 per cent (Nair 1985: A-89, A-93). The buffalo has become the mainstay of milk production, especially in Gujarat, Punjab and Andhra Pradesh because it has been identified as the most efficient means of converting a large supply of crop residues into milk (George 1986: 2149; George 1985: 97).

Lastly, economic independence will be sustainable when the economic policies adopted are ecologically sound, that is, when they focus on increasing the biomass available to the villagers in an equitable manner. The importance of this view has been clearly articulated in the following definition of poverty:

> Economists will have to *redefine poverty* not as a shortage of cash but as a shortage of biomass resources to meet basic survival needs. This definition will be far more successful in measuring the acute poverty and drudgery that the poor of India face today (Agarwal and Narain 1989: 3).

The debate on OF has not focused directly on this issue but it has raised important questions that have a bearing on it. One of the main characteristics of livestock population in India is its functional duality of purpose. It must produce milk for human consumption and bullocks for draught power. A male buffalo is less suited for draught purposes than a bullock. Given the scarcity of fodder, a pressure to increase the buffalo population for milk purposes will not only exert an unbearable demand on grazing land but may lead to a shortfall in available male traction animals, thus disturbing the delicate balance that livestock maintains in a small agricultural household (George 1985: 85-87).

By far the greatest threat to the eco-system is the disturbance that will result from the pressing need to expand grazing land. This expansion necessarily involves an encroachment of grazing land on croplands and forestlands, thus upsetting the balance between the three. This damage may be compounded by over-grazing, privatisation of common lands, and the destruction of vegetation and small trees by browsing cattle. Chapter 4 (Section 4.7.4) deals with the fodder crunch experienced by tribal milk producers and outlines the negative impact of dairy farming on an already damaged eco-system. As in other parts of the country, the forests of South Gujarat, the natural habitat of the tribal communities, have been ravaged by the systematic plundering of unscrupulous contractors.

A great deal of ink has flowed in discussing the social impact of OF. It may be recalled that social viability, that is, the capacity of a programme to reduce economic inequalities, is the second criterion to determine the developmental nature of a programme. To place the hypothesis advanced by this study in its proper context we review briefly the main arguments of the literature on this subject.

S. George (1985: 130) has articulated the early social dream of OF as follows:

> The green revolution brought both augmented production and increased disparity: the white revolution promises the former without the latter, and further, claims to narrow the gap between rich and poor that the green revolution was responsible for widening.

Even Kurien has been quoted as saying that one of the criteria to quantify the benefits from dairy farming is whether dairying can selectively raise the living standards of the poorest farmers (Acharya and Huria 1980: 1939).

However, a careful analysis of the official documents stating the main policy of OF reveals a declining emphasis on social goals. While OF-I specifically mentions the improvement of small farmers and landless people, OF-II nowhere mentions them explicitly as a target group (George 1985: 9-16). There seems to be an unconscious design to gloss over this shift in emphasis. A recently published book on dairy cooperatives in India (Mascarenhas 1988: 124) states all the objectives of OF-I but fails to mention that the goal of improving the productivity of dairy farming and

increasing agricultural incomes is further modified in the original text by the following phrase: "with special emphasis on improvement of the income of small farmers and landless labourers". The omission of this phase by Mascarenhas from his quotation of official OF objectives is an indication of the shift in priorities that has silently taken place.

However, the defenders of OF claim that the new programme of dairy farming has undoubtedly benefited small farmers. Nair gives the example of Kerala where small farmers with little or no land own a sizeable proportion of the total stock of milch animals. For example, those holding 0.4 acres own 45 per cent of the total animal stock (Nair 1979: A-33). The relative advantage of dairy farming for small farmers and landless labourers is that it supplements their income. Acharya and Huria show that for families owning a small area of land, the income from dairying is surprisingly higher than the total remaining farm income. The benefits of dairy farming reach even the landless labourers. Subject as they are to seasonal unemployment, they obtain the income needed for their sustenance during the off-season from dairy farming (Acharya and Huria 1980: 1939).

On the basis of this and similar data, some suggest that milk production is scale-neutral or even biased in favour of small holders and landless rural households (Shah and Bhargava 1982; Dorsten 1985: 36). It has also been pointed out that the distribution of milch animals among households in a village is less skewed in favour of the rich farmers than land (Nair 1980: 447).

OF critics, on the other hand, strongly deny that the poor benefit from their programme; they even go so far as to say that it works against them. R. Crotty is a strong spokesman for this point of view. His argument is as follows. The fact that big farmers have more cows per household than the landless is misleading; from an economic point of view it makes more sense to say that they have fewer milch animals per acre of farmed land than the poor. They are, therefore, in a position to provide more than adequate feed for their cattle and to sell surplus fodder to the poor thereby increasing the latter's dependence on them. Rather than redressing the inequalities resulting from the Green Revolution, OF exacerbates them (Crotty 1980: 185-6).

The inability of OF to benefit the poor stands out more clearly when we take cognisance of the fact that the new technology of dairy farming

requires a complementary package of inputs, especially fodder. Small farmers and landless labourers have a very low resource base and are hence unable to feed their animals; this results in a high rate of dry animals (Dogra 1985: 103; Shah 1981: 56-57).

Baviskar's research in three villages of Gujarat shows clearly that returns from membership in milk cooperatives are proportionate to land-holding size or asset base, and the most genuine landless labourers remain outside the fold of the cooperatives (Baviskar and George 1985: 1551; Baviskar 1988: 354-55).

OF has strengthened the acquisitive tendency of the rich farmers. They not only attempt now to privatise the available common land, but doing away with the traditional understanding that the poor may collect crop residue and grass without payment, they start selling it.

We may finally note that in a situation where fodder availability throughout the year is doubtful, small and marginal farmers are likely to be unwilling participants in the programme. This is because the uncertainty regarding fodder introduces an element of high risk into their productive activity. Small farmers and landless labourers, unlike rich farmers, generally attempt, for reasons of sheer survival, to minimise risk rather than maximise profits.

All these arguments advanced by the critics of OF cannot be easily dismissed. They point out a basic flaw in the developmental nature of the OF programme. Knowing that old habits die hard, one should not be surprised at the way in which this criticism continues to be dismissed with a flourish of the pen. R.C. Mascarenhas (1988: 87), for example, acknowledges that Shanti George's "major opposition to the Anand pattern is on distributive and nutritional grounds". However, he dismisses it with these words:

> As both could occur in the absence of an Anand milk cooperative, at least the cooperative provides technical inputs which help to increase production, as has happened in other parts of India. Besides there is the possibility of a movement from the *status quo*.

This study analyses in detail the social impact of OF on tribal milk producers. In Chapter 5 we analyse the class distribution (land inequality)

existing in the villages under study. Chapter 6 discusses the class distribution of the members in the milk cooperatives and the relationship between the patterns of land and buffalo ownership. Chapter 7 examines the distributional pattern of income and cash benefits among the tribal cooperators. This study not only considers the social impact of economic benefits but also attempts to gain an insight into the distributional pattern of input utilisation and of the acceptance of the new technique of rearing buffaloes. This broad analysis of the social impact will allow us to examine one of the most important components of a development programme: its impact on equity.

The third criterion of development is the potential of a programme to increase the organisational power of the poor. The debate on the merits and demerits of OF does not deal clearly with this formulation of the issue; rather it discusses the Anand pattern of cooperatives as a modern organisation enabling rural milk producers to achieve the goals of OF. The Anand pattern of cooperatives refers to the two-tier system of milk societies established all over the country on the model provided by the Kaira District Cooperative Milk Producers' Union (KDCMPU). A number of village societies are responsible for procuring milk and they are integrated into a District Union cooperative entrusted with the task of processing and marketing this milk. In 1973-74 the District Union cooperatives of Gujarat united to form the Gujarat Milk Marketing Federation (GCMMF) in order to gain the benefits of a centralised processing and marketing strategy (Shah 1986: 26-31; George 1985: 157-80). At present, therefore, the milk cooperative structure in Gujarat has changed from a two-tier to a three-tier system. The Anand model "is a specific form of rural *cooperative* established mainly for marketing purposes" (Doornbos 1985: 11).

Before dealing with the issues raised by the OF debate regarding the Anand pattern of cooperatives, it might be useful at this stage to state clearly the underlying model of a cooperative used in this study. This may also help us sort out the main points raised in the OF debate in a more logical manner. The original formulation of this model has been presented elsewhere (Seetharaman and Mohanan 1986: 1-15); the one explained here is a modified version.

As a distinct organisational entity, a cooperative performs a dual role: economic and social. As an *economic enterprise*, the cooperative must satisfy the goals of any business organisation: profitability, expansion, diversification. The achievement or non-achievement of these goals deter-

mines the success of a cooperative as an economic organisation. As the *institution* of a particular community or group, the cooperative has a *social role* to play. In other words, the cooperative is responsible for changing the situation of the community: from being dependent on and controlled by other dominant groups to being more self-reliant and capable of deciding its own destiny.

This social responsibility demands that the cooperative:

1. ensure the growth of individual members and provide all of them equal access to the benefits generated by the group, thereby satisfying the principle of equity;

2. generate a groupal or communitarian experience of positive change in the relationships of the community to the physical and social environment: by this is implied changes in the management of natural resources, technology, finance and credit; in groupal self-consciousness leading to greater self-esteem of individuals, in the behavioural patterns of members towards each other; in the elaboration of new normative rules to deal with social problems, and in the pattern of relationships established with the dominant groups and government officials;

3. create consequently a greater unity in the community enabling it to acquire greater bargaining power *vis-a-vis* other dominant groups at the economic, social and political levels.

If a cooperative becomes a successful enterprise but fails to fulfil its social role, then it ceases to be a cooperative and becomes a mere business organisation. On the other hand, if a cooperative fulfils its social role at the cost of its economic viability it will soon collapse. Meeting these twin objectives is not an easy managerial task, and this may explain the limited success experienced by the cooperative movement in India. When a cooperative, however, achieves some degree of success in integrating both roles, it can become an efficient instrument to increase the power of an oppressed community or group. It is in this sense that we speak of a developmental intervention as empowering the poor.

We may now turn our attention to the issues raised by the OF debate and analyse them within the model of the cooperative outlined above.

The proponents of the Anand pattern of cooperatives have unanimously stressed the success of this model as an economic enterprise. One of the main reasons for this success is the distinction brought about between the production/procurement and the processing/marketing operations. The integration of village societies into a Dairy Union and of all Dairy Unions into a State Marketing Federation undoubtedly brings the positive effects of economies of scale to the individual producer. The success of these cooperatives as economic enterprises can also be gauged by the extent to which they have been able to capture a considerable part of the milk products market, to raise milk output and productivity, to break the traditional trade channels and provide subsidised services to the cooperators. One may surmise that in this area the Anand pattern cooperatives, especially in Gujarat, show a rather positive record. A critic like Doornbos has reservations only in the matter of increased milk production (Doornbos 1985: 12).

S. George is more critical in evaluating the economic performance of these cooperatives. She argues that "it is not the cooperative which was the prerequisite for the dairy achievements of the district, rather the dairy performance of the district preceded the cooperative" (George 1988: 399). She attributes the success of these cooperatives not to their organisational structure but to a number of other considerations peculiar to the area and to the enterprising character of the farmers.

One of the most controversial issues in the OF debate is the social role played by these milk cooperatives. There seems to be a pervasive scepticism regarding the role that cooperativism in general can play in reducing rural inequalities.

> Cooperation, whether formal or informal, whether based on grassroots initiative or state planning, is not likely to change the indigenous social structure very far.... The true value of cooperatives may lie not in their dubious claims to overcome inequality, but rather in their potential for overcoming the technical and managerial problems of horizontal integration among a host of small producers (Attwood, Baviskar 1988: 5-6).

However, some isolated voices uphold the positive social impact of the cooperatives. The main line of argument runs as follows. Milk cooperatives on principle provide equal access to the milk market to all producers regardless of caste and creed (Baviskar and George 1988: A-38). The

democratic values adopted by the cooperatives provide an underpinning at the village level for democracy in the country. This principle of equal access for all acts as an effective deterrent against the divisive forces of caste, class and religion and, in the long run, may inhibit the process of fragmentation of rural society. In other words, the cooperative becomes an instrument for upward social mobility and for a more equal redistribution of income and social status without creating conflict or confrontation (George 1985: 129-9).

Facts seem to contradict this airy claim. The counter-argument runs as follows. Positions of power merely reflect the power structure existing in the village; "the chairman and the secretary of dairy cooperatives are generally from the local dominant caste/community" (Shah 1981: 20-1). The benefits have not accrued to the landless but middle-caste Hindu members. In addition, the poor feel discriminated against: the rich and influential always seem to obtain a higher fat content for their milk, and they manage to corner the services provided by the Union Dairy (Gurucharan and Dogra 1985: 113-32). The hard world of facts suggests that a prior change in the village power structure is necessary if the Anand-pattern cooperative is to be an instrument for empowering the poor. Summing up this failure S. George (1986: 2166) writes:

> In Operation Flood's milksheds, therefore, if you belong to the upper or middle classes and castes, the village milk cooperative will strengthen both your economic and political position. If you are lower class but of middle caste, the dairy cooperative will be of some relevance. However, if you are both lower class and lower caste, you are doubly dammed, and the milk cooperative will not help you overcome either handicap.

The failure of the cooperatives to provide a more egalitarian structure is manifested in more basic and ordinary business matters. One would expect the member producers to benefit from the profits made by the Union Dairy. This is not the case.

> The Union follows a policy of distributing only a small percentage of its profits as dividends and bonuses to producer members enrolled in village societies, holding back the lion's share in the form of retained earnings (George 1988: 409).

Eye-openers like the example of Choryasi Taluka Milk Sale Cooperative Society Ltd. help us to perceive more clearly the social failure of the

Anand pattern. The above mentioned cooperative society located in Surat and *outside* the NDDB fold has succeeded in making higher profits and paying better prices to producers than SUMUL (George 1988: 410).

This book examines at various levels the impact of milk cooperatives on the organisational power of the tribal community. The starting point of the argument developed in the following pages is that the Union Dairy (SUMUL), to which these tribal milk cooperatives are affiliated, has generally failed to develop the organisational capabilities of these milk cooperatives. To redress this important deficiency a voluntary organisation was asked to design and implement an action programme. Chapter 3 explains the nature of this Animal Health Programme (AHP) which was envisaged as a means to develop local leadership and enable the cooperative members to control more effectively the process of milk production. Chapter 6 offers a comparative analysis between the class distribution of households and the class distribution of cooperative members in each village society. It also investigates the proportion of tribal households that have opted to remain outside the cooperative and their reasons for doing so. This analysis throws light on the degree of acceptance by the tribals of the cooperative. This in turn throws light on the kind of institutional effect that the cooperative may have on the community. This part of our study suffers from certain limitations. The real test to check whether dairy cooperatives have brought about a change in the power of the tribals is to trace the number of tribals who occupy positions of power in the pyramidal organisational structure of the district Union. This book does not provide concrete information on this topic. It is, nevertheless, common knowledge that the relative volume of milk contributed by tribal societies to SUMUL is greater than the relative tribal representation in the district committee.

Having dealt with the criteria for judging the developmental character of OF, we turn to the second major theme of this book, namely, the role played by Non-Government Development Organisations (NGDOs) in the implementation of OF.

NGDOs are legally constituted non-profit organisations working at the local level for the development of the poor. This kind of "human growth oriented," "change agent," "strategic organisations," as Khandwalla calls them, are characterised by their resource dependence on government and foreign funds, the transformational or developmental role they play, and the unfamiliar tasks they undertake (1988: 32-3). In short,

> These strategic organisations. . . . must operate flexibly in an unfamiliar terrain and as "open" and participative systems; they must win over their often conservative, traditional, poorly educated, and ignorant clients through persuasion and participative methods; they must adapt to local situations and resist excessive standardisation; and they must instil in their rank and file the kind of work, cooperation and innovation ethic so vital to mission accomplishment (Khandwalla 1988:33).

In the context of OF we must examine the role that NGDOs can play within the policy framework decided by NDDB. This framework is important because it limits, in a way, the target group attended to (milk producers), and the type of activities undertaken by the NGDOs (milk production and procurement). This is also the perspective from which the role of the NGDOs will be examined here.

Since an important element of the new dairy policy of NDDB is the development of dairy farming through the creation of milk cooperatives, NGDOs entering this field of development may do so with the intention of helping to establish or strengthen milk producers' cooperatives. Any evaluation of the NGDO's role must be related to its understanding of the objective of cooperatives, that is, to its philosophy of cooperativism.

Our contention is that an evaluation of the role played by the NGDOs in OF must be guided by a correct understanding of the objectives attributed to a cooperative. The stress already laid on the economic and social aspects of a cooperative clearly indicates that an important part of the NGDO's role is to facilitate the harmonious development of both aspects. In the last analysis, the NGDO must ensure that the cooperative becomes an instrument to strengthen the power of the community and of each individual to deal with the physical and social environment.

The debate on OF has not directly touched upon the contribution of NGDOs. It is possible nevertheless to outline two extreme positions in this matter. Ardent critics of OF can argue that NGDOs should not collaborate in setting up milk cooperatives because they are indirectly supporting a dairy policy inimical to true development. The official position of NDDB may defend the intervention of the NGDOs on the grounds that the latter can effectively become a link between the milk producers and the Union Dairy officials; since NGDOs generally have close contacts

with the people, they can help the poor in expressing their interests. Furthermore, their credibility with the community can aid in persuading many to start this economic activity.

Of special importance to our topic are the short contributions of Marc Verhagen (1986) and Baviskar (1986). The former analyses the experiences of five NGDOs active in dairy development, and the latter examines the first tribal milk cooperative set up in the same area and by the same type of NGDO as the one analysed in this study.

Verhagen assesses NGDOs working with dairy programmes according to a single criterion: do their efforts directly and specifically benefit marginal farmers and landless labourers? This criterion is met when the real beneficiaries of the dairy programme are these two groups and when the methodology adopted by the NGDOs is geared to solve their specific problems. On the basis of the specific problems faced by these two groups, Verhagen (1986: 6) states that the strategy followed by the NGDOs must:

1. promote actively the development of fodder for the poor;
2. provide them with credit, other inputs, guidance and training;
3. foster the participation of the poor in the design and the implementation of the programme; and
4. accept conflict and attempt to manage it.

Verhagen's study assumes that the efforts of the NGDOs to help the poorest in a village are limited by external and internal factors. The former arise as a consequence of the NGDOs' need to interface with donor agencies, the bureaucracy, local power groups, and scarcity of fodder, all outside forces which may hinder their efforts to help the poor. The most crucial of these obstacles is the scarcity of fodder, affecting mainly the landless labourers. Four out of the five NGDOs studied by Verhagen were unable to set up special fodder programme for the benefit of the poor. The remaining NGDO was able to solve the fodder needs of the poor because of availability of grass in the area. Internal limitations are the result of specific features inherent in the organisational structure of the NGDOs, such as size, degree of decentralisation, ideology, and motivation of their members, all characteristics which may hamper their working effectively for the poor.

Verhagen's conclusions are quite pessimistic:

> Considering the experience of NGDOs in dairy development. . . . it seems that, as yet, we have to be skeptical regarding the viability of dairy development for the poor, the landless labourers and the marginal farmers, through the involvement of these alternative institutions. NGDOs not only seem to face severe external barriers, but many of them are also internally not ready to take up the cause of the poorest, the landless labourers. Only under exceptionally favourable external conditions, therefore, the NGDOs in the several cases studied could be successful in their dairy development efforts for the poor (1986: 59).

Verhagen's chosen criterion for assessing the effectiveness of the NGDOs leads to his pessimistic conclusion and may be questioned. His approach suffers from an important limitation: he does not deal with the effect of milk cooperatives on the whole community. For example, commenting on the performance of the Adivasi Pragati Kendra, a tribal milk cooperative located in Mandal, Surat district, he writes that, "in this case, however, the focus was on the community, not on the poor in particular" (1986: 53). This "obsession" with the landless leads him to under-estimate the benefits accruing to the community and to overstate the problem of the landless.

A study of the same village (Baviskar 1986: 36) informs us that about 21 per cent of all households were milk producers, while about 28 per cent of the landless were milk producers. In addition, we also come to know that, although 32 households were legally landless, only six households were dependent on agricultural labour as their major occupation and source of livelihood. 20 households had access to land and the remaining 6 had members with salaried jobs. These data show that (i) landless labourers may have access to land, (ii) they have joined the cooperatives in relatively greater numbers than all the households of the village taken together, and (iii) the effect of dairy farming on the entire village has been disregarded.

Baviskar's study documents the working of the first tribal cooperative set up in Surat district. His analysis dwells on the special socio-economic characteristics of the tribal area in Surat district, and on the features of the NGDO instrumental in starting this milk cooperative. Unlike Verhagen he concludes that

> the successful example of a dairy cooperative in Mandal suggests that dairying is a viable activity for tribal economy and people. It is true that Mandal is not a typical example. But with some special effort it is possible to achieve similar results in other villages in the area. Because of the proximity of the jungle area, fodder is not a serious constraint here as in some other areas. What is more, there is no better alternative in view to provide employment and income generating activity among the tribals (1986: 42).

The main achievements of the cooperative are: (i) the introduction of the tribal community to buffalo rearing, (ii) the increase in cattle wealth, (iii) the provision of a steady source of income, and (iv) the degree of participation by all the tribals in the cooperative.

In the light of these two divergent views, this book attempts to take a closer look at the role played by some NGDOs in developing tribal dairy farming along the Anand-pattern cooperatives.

Chapter 1, in its descriptive account of the region and its inhabitants, establishes that the various tribal communities of South Gujarat, despite certain cultural differences, all share the common characteristics of a low level of economic development. This stands out with startling clarity in the light of the various government schemes meant exclusively for the tribals. The higher economic level obtaining in non-tribal talukas throws the issue into sharp relief. Inter-taluka and inter-district comparisons are made in this chapter to highlight the differences between the prosperity levels of tribal and non-tribal populations in the three talukas with which the present study deals. A comparative analysis is made on the basis of such generally accepted development indices as literacy rates, land-use, and ownership patterns.

We need to distinguish between two types of NGDOs discussed in this study (section 1.5). The first type refers to seven Catholic NGDOs which by 1979 had started Milk Producers' Cooperatives (MPCs) in about 125 tribal villages of Surat and Bharuch districts. The second type refers to the Behavioural Science Centre (BSC), a non-denominational NGDO managed by the St. Xavier's Non-Formal Education Society of Ahmedabad. In September 1981, the BSC was called in to conduct an evaluation of the economic performance of the MPCs and to suggest ways and means to improve it.

The BSC judged that its intervention in the form of an Animal Health Programme (AHP) designed for the MPCs established by the NGDOs would not only raise the economic performance level of the cooperatives, but also enable them to realise their social role as educative, transforming and leavening agents in society.

Chapter 3 explains in detail the objectives of the AHP and the educational methodology followed. The educational component of the programme was considered very important in view of the BSC's goal of augmenting the organisational ability of the tribal community. In the context of the Logical Framework Matrix (LFM) used to rank the different goals of a project (Chapter 2), the rationale of the AHP may be explained as follows.

The first two levels of objectives in the pyramid of the Logical Framework Matrix, *inputs* and *outputs*, were seen as forming the ground on which the whole programme and the cooperatives would grow. Inputs comprise the educational package offered by the BSC to a group of selected Trained Village Workers drawn from among the tribals themselves. These TVWs are (i) trained in various aspects of animal health and rearing; and (ii) educated into forming new perceptions and attitudes towards both the environment and their fellow tribals. The aim is to create a cadre of TVWs who will understand better, not only the causes of disease, but also their own power to modify and check those causes.

These inputs, once received, flow out in the form of *outputs* from the TVWs to the entire village, i.e., the TVWs transmit their newly acquired skills in the form of services, and in so doing not only provide practical help, but also act as visible and convincing examples of the tribal's capacity to control his environment. Outputs — which are really inputs in action–in turn provide experience-based information, used now to change the inputs if necessary.

These inputs and outputs which feed each other are held together in a symbiotic relationship through the Management Information System. The MIS generates and disseminates specific information regarding each interacting component of the AHP, and *monitors* the information generated so as to modify continuously the educational inputs. The cooperative members as well as those at the junior, middle and top management levels of the organisational structure are in constant interaction with one another through the MIS which serves as a channel for the changing and circular flow of information.

Transfer of technology thus becomes creative, and education is an organic, on-going affair in which there is participation at all levels. The technology that has been transferred produces a new technology, one better suited to the environmental needs of the community. In this process of creative appropriation and assimilation of technology, the tribal finds that his attitudes are changing and that his cultural universe has been gradually transformed. In short, by evaluating the economic (Chapter 4) and the social (Chapters 5 to 9) impact of the AHP, the book examines the role played by the BSC in making the cooperatives more efficient agents of social change.

Not all NGDOs mentioned above have followed the same approach. This book analyses the two main strategic models adopted by these NGDOs. The Dediapada Social Service Society located in Dediapada taluka of Bharuch district adopted an extensive and centralised approach. In the hope of alleviating the appalling poverty of the tribals, this NGDO covered as many villages as possible but set up only one cooperative in Dediapada. The Samaj Seva Sangh Society located at Zhankhvav in Mangrol taluka of Surat district adopted an intensive and decentralised approach. It set up MPCs in only a few villages with a central office in Zhankhvav.

A final word about methodology. Village studies on OF have mainly relied on data collected at a particular point of time. For the first time, this book presents the results of a longitudinal analysis of the selected variables that is, an analysis based on data collected during a three year period covering the lean as well as the flush seasons. Chapter 2 explains the Logical Frame-work Matrix and the various indicators used to evaluate the economic impact of the AHP. Chapter 3, and especially Appendix 3.2, explains the various sample sizes used in the economic evaluation. The methodology followed to evaluate the social impact of the AHP is described in Chapter 5 and the characteristics of the sample are discussed in section 5.3.

Part A

Economic Impact of the Animal Health Programme on Tribal Dairy Cooperatives

Chapter 1

Dairy Farming Among Tribals

1.1 Introduction

This study deals with dairy cooperatives established in the tribal belt of South Gujarat and affiliated to the Surat District Cooperatives Milk Producers' Union (SUMUL).[1] These cooperatives cover a number of villages in Dediapada Taluka of Bharuch District and in Mangrol and Mandavi Talukas of Surat District.

The aim of this chapter is twofold: to provide a general idea of the relative level of poverty and underdevelopment of these three 'tribal' talukas; and to explain why some voluntary organisations have found it meaningful to introduce dairy cooperatives of the "Anand pattern" among the tribals and to help them manage their activities more efficiently.

There is a clear advantage in starting our analysis in this fashion. The fact that the poverty and development levels of these talukas are very low affords us with a useful basis for testing the claims made by the advocates of OF as well as by the voluntary organisations regarding their goals. The defenders of Operation Flood (OF) claim that the new dairy policy is part of a developmental strategy aimed at helping the rural poor.[2] In the words of the Jha Committee: "Operation Flood, together with other related development programmes has, thus, a vast potential for tackling the problems of rural poverty" (quoted in George 1986: 1027; NDDB 36-37; Somjee 7-8; George

1. Though the cooperatives located in Dediapada taluka are not officially affiliated to SUMUL–no cooperative located outside Surat district can be affiliated to SUMUL–they have been selling milk to SUMUL from the beginning. For all practical purposes, therefore, the study considers them as belonging to SUMUL.

2. For further information on OF objectives see S. Singh, 1979: 1765, K.N. Nair, M.G. Jackson, 1981: 2130. It must be noted that some writers have de-emphasized OF's role in helping the poor in recent times (Randeria, 1987: 977; P.C. Bardhan, 1987: 1465). Some commentators think that the "OF II authorities have selected a larger proportion of the districts from the more developed states ... (and) the coverage of the programme is comparatively low in states which are at a lower level of development" (S. Singh and R.K. Sharma, 1981, A-17).

1985: 9-19; Baviskar 1986: 10; Van Dorsten 1985: 3-7). Voluntary organisations have wanted to ensure that the tribals benefit from the government programmes intended for them and to ensure that these activities become a means to develop the organisational power of the tribal communities.

The arguments developed in this chapter are intended to lay the foundations for evaluating these claims. First, they show that the cooperatives affiliated to SUMUL which have been chosen for this study are located in the relatively less developed talukas of Bharuch and Surat districts;[3] the analysis of their performance will indirectly check whether SUMUL has fulfilled the OF objectives of helping the rural poor. Second, they portray the difficult conditions under which the voluntary organisations established these cooperatives. The study of these cooperatives will help to evaluate the role that these organisations can play *vis-a-vis* the new dairy policy.

1.2 The Dialectics of Poverty and Affluence

The tribal belt in Gujarat extends from Banaskantha district in the north, through the Panchmahals to the Bharuch and Surat districts in the south (Figure 1). This eastern belt borders the neighbouring states of Rajasthan, Madhya Pradesh and Maharashtra. In this border area, the flat lands of Gujarat give way to hilly tracts of forests which have always been the tribals' habitat. Massive and indiscriminate felling of trees has changed this hilly region into a barren land. In sharp contrast to the western tracts where green and lush fields predominate, the eastern region inhabited by the tribals is now largely composed of stone-strewn fields (*'patharal jamin'*) denuded of any forest cover. Different tribal communities *(Vasavas, Gamits, Kokanas, Chaudharys, Bhils, Dublas, Kotvadias)* have settled in this region of South Gujarat. They still preserve a certain degree of cultural and social differentiation; unfortunately most, of them share a very low level of economic development.

The unevenness in the economic development of the eastern and western regions of south Gujarat has been attested by various studies (Baviskar 1986: 3-4; Breman 1979: 25-35; 1985: 28-47). The conclusion is

3. The term 'less developed' has been preferred to the term 'backward'. We mean here a situation where literacy levels are low, agricultural activities are geared to self-subsistence and hence income levels are depressed to a minimum. We have omitted the word backward to avoid a controversy going on at present in Gujarat on the issue of selecting the correct criteria for 'backwardness'. For an innovative discussion on the topic see I.P. Desai, 1984: 1106-1116. Successive finance commissions have devised different criteria to decide the degree of 'backwardness' in various states. It appears very difficult to use the word 'backward' in a commonly accepted way.

obvious: tribal poverty in the eastern talukas co-exists with the high level of development achieved by non-tribal talukas; the poverty of the tribals lives in a symbiotic relationship with the wealth of non-tribals. The dialectics of poverty imply that we look for its cause in the wealth that it sustains. Surat district is a good example of this (Figure 3).

With the help of data provided by the Census of India 1981, a set of variables was chosen to describe the tribal character and the developmental level of all the talukas of Bharuch and Surat districts. Table 1.1 presents the variables and their indicators.

Table 1.1: Variables and Indicators for each Taluka

Variables		Indicators
1. Tribal character	1.	Percentage of tribal to total population
2. Level of development	2.1	Percentage of literates to total population
	2.2	Percentage of irrigated land to total cultivable land
	2.3	Percentage of villages having power supply
	2.4	Percentage of cultivators to total main workers

Note:

1. *Cultivable land* is the total amount of land available for cultivation excluding forest and non-cultivable land.
2. *Irrigated land* is that part of cultivable land under irrigation; it excludes non-irrigated and cultivable waste land.
3. *Main workers* are those who have worked for six months or more in any economically productive activity.
4. *Cultivators* are those main workers who cultivate through direction and supervision their own land or land leased from government land; it excludes agricultural labourers, and workers in house industries and other services.
5. *Agricultural labourers* are those main workers who work on someone else's land for wages.

Let us examine first the relationship between the tribal and non-tribal talukas of Surat district with the help of Table 1.2. The more significant correlation coefficients among these variables throw some light on the uneven economic development achieved by the tribal and non-tribal talukas. Note that the tribal character of a taluka is associated with low literacy, total lack of irrigated land, predominance of cultivators and a low proportion of agricultural labourers. Irrigated land and, to a lesser extent,

Table 1.2: Correlation Coefficients

	Surat District				Bharuch District			
	Literacy	Irrigated land	Self-cultivation	agricultural labourers	Literacy	Irrigated land	Self-cultivation	agricultural labourers
Tribal Population	-0.44	-0.82	0.88	-0.38	-0.78	-0.10	0.38	-0.42
Power Supply	-	0.89	-	-	-	0.67	-	-
Irrigated land	-	-	-	0.60	-	-	-	0.30

literacy, are the monopoly of non-tribal talukas. Since the correlation between power-supply and irrigation is positive and high, we can also assume that the non-tribal talukas have cornered the most crucial resources for a sustained breakthrough in agricultural production. The above data provide also a general outline of the different production relations[4] existing in tribal and non-tribal talukas. In the former, self-cultivation with the help of family labour mainly for self-subsistence prevails, while in the western, non-tribal talukas, "capitalist" agriculture, that is, cultivation with the help of wage labour for commercial purposes is gaining ground. It is plausible to surmise that migration from the tribal talukas provides the main source of cheap and available labour. The dialectics of poverty (tribals) and affluence (non-tribals) results in the proletarianization of an increased number of marginal and landless tribals. Unable to make a living out of their unproductive small holdings, they are forced to become agricultural labourers in the non-tribal talukas of the District. This displacement not only affects the cultural life of the tribals but also their political voice; they are forced to leave the tribal talukas where political power at all levels is in the hands of their own people, and move to non-tribal talukas where they have to reckon with the established political power of the non-tribals.

The relationship between the tribal and non-tribal talukas of Bharuch district is somewhat different (Table 1.2). We may notice that the correlation coefficients are of the same sign as the correlation coefficients for the talukas of Surat district. This means that the relationship among the variables keeps the same direction in both districts, but the absolute size of the coefficients is different. Tribal talukas in Bharuch district are characterised by a low level of literacy, while the non-tribal talukas exhibit a high literacy level. The

4. The term 'production relations' refers to relations among individuals or groups which arise from their participation in an economic activity.

correlation co-efficients between tribal population and literacy for Surat and Bharuch districts show that the difference in educational levels among tribal and non-tribal talukas in Bharuch district is greater than in Surat district.

The production relations in tribal and non-tribal talukas of Bharuch district do not show any significant difference. The same conclusion may apply to differences in irrigation and power-supply among the tribal and non-tribal talukas. These observations lead us to conclude that the unevenness in agricultural development among the talukas in Bharuch district is less than among the talukas of Surat district. A plausible explanation may lie in the fact that the overall level of development of Bharuch district is well below that of Surat district.

1.3 Socio-economic Features of the Dediapada, Mangrol and Mandavi Talukas

We propose to highlight in this section the specific socio-economic characteristics of the three talukas where the cooperatives chosen for our study are located. In particular, we want to prove that Dediapada is probably the least developed taluka in Bharuch district, and that it is less developed than Mangrol and Mandavi talukas of Surat district. Establishing this will go a long way in strengthening our argument set out in Section 1.1 that choosing the poorest taluka for our study provides us with the sharpest evidence for testing the claims made by advocates of OF. The reasons adduced to explain the poverty level of Dediapada rely on the Census data of 1981 and on the variables defined in Table 1.1.

1.3.1 Tribal Character

The tribal character of a taluka may be broadly defined according to three variables: proportion of tribals to the total population; proportion of forests to the total land; and density of population. The proportion of tribal to total population in the Dediapada taluka is the highest (93 per cent) in the whole of Bharuch district.[5] The tribal character of Dediapada can also be gauged by the relative proportion of forest to total land. More than half of its total land area (55.6 per cent) is covered by forests. No other taluka in Bharuch and Surat districts taken together has as much area under forests. Dediapada then emerges as one of the most typical of all tribal talukas in Bharuch and Surat districts. The density of the population in Dediapada is the lowest (86 per square km) in the whole of Bharuch district (the average

5. The figure of 93 per cent is also the highest proportion of tribals for all the talukas in Surat district with the exception of Uchchal (97 per cent).

for the district being 143). This characteristic is in keeping with the typically scattered nature of the population in tribal areas.

Mangrol and Mandavi talukas also have a large proportion of tribals: 66 per cent and 77 per cent respectively. If we were to list all the talukas according to the proportion of tribals to the total population, Mangrol and Mandavi would occupy a middle position.[6] These two talukas have a relatively low proportion of land under forest: 25 per cent in Mandavi and 9 per cent in Mangrol. In comparison with Dediapada, Mangrol and Mandavi talukas have undergone a greater degree of deforestation in common with other tribal talukas of Surat district.[7]

In terms of tribal population and area under forest, the tribal character is more pronounced in Dediapada than in Mangrol and Mandavi talukas.

1.3.2 Level of Development

Dediapada has the lowest (22 per cent) literacy rate among all talukas in Bharuch district: only one-fifth of its population is literate as against the district's average of 43 per cent. The situation of women is worse: only 26 per cent of Dediapada's literate population are women, which is also the lowest in the whole district. Literacy levels in Mangrol and Mandavi talukas are higher than in Dediapada: 34 per cent in Mandavi and 36 per cent in Mangrol.[8]

Irrigation is almost non-existent in Dediapada; only 1.5 per cent of the total cultivable land is irrigated. The situation in Mandavi and Mangrol is only marginally better: 5.2 per cent of the total cultivable land in the former and 4.76 per cent in the latter are irrigated. We may add here an important clarification. Though in absolute terms, the three talukas exhibit approximately the same lack of irrigation facilities, in relative terms, that is, in relation to the irrigated area in other talukas of the district, the position

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6. In Surat district there are five talukas with a higher proportion of tribals than the percentage of tribals in Mandavi. They are: Uchchal 97 per cent, Vyara 88 per cent, Songad 82 per cent and Mahuva 80 per cent. Two other talukas with a higher proportion of tribals than the one obtaining in Mangrol are: Nizar 75 per cent, Valod 73 per cent.

7. It is interesting to note that there are *seven* talukas in Surat district and only *four* in Bharuch district with more than 5 per cent of their total land under forest. Nevertheless, the extent of deforestation that has taken place in the tribal talukas of Surat district can be gauged by the fact that there are eight talukas in the district with a percentage of tribal population greater than 66 per cent–this number is only four in Bharuch district, while in only three talukas the percentage of total land under forest is 25 per cent.

8. As regards female literacy, the difference between tribal and non-tribal talukas of Bharuch and Surat district is not marked.

of Mangrol and Mandavi is much worse than that of Dediapada. In Bharuch district there is only one taluka (Amod) with more than 25 per cent of cultivable land under irrigation; as against this, in Surat there are five talukas with more than 25 per cent of irrigated land.

The lack of irrigation facilities is accompanied by a limited supply of electric power: only 14 per cent of Dediapada's villages have been electrified; this represents the lowest percentage for the whole of Bharuch district. In Mangrol and Mandavi talukas about one-third (31 per cent and 40 per cent) of the villages have been electrified.

In conclusion, Dediapada is the most 'tribal' of all the talukas in Bharuch and Surat districts, and simultaneously, it is the least developed in the matter of irrigation and power supply. The technological potential of agriculture in this taluka has been left almost entirely undeveloped.

A general idea of the prevalent production relations in the three talukas can be obtained from the analysis of the degree of occupational diversification, the proportion of non-productive workers, and the relative numerical strength of self-cultivators and agricultural workers in the total work-force of the three talukas.

Dediapada taluka has the dubious distinction of having the lowest percentage of:

1. workers employed in industrial and other occupations (9.6 per cent),
2. non-productive workers (42.78 per cent),
3. agricultural labourers (22.7 per cent),[9] and
4. highest percentage (67.73 per cent) of self-cultivators in Bharuch and Surat districts.

The combination of these characteristics cannot be casual. Rather, it explains the type of production relations existing in the taluka and its abysmal level of development. To put it differently: more than in any other taluka of Bharuch and Surat districts, occupational diversification in Dediapada is almost non-existent; the majority of tribal households are self-cultivators who use family labour; capitalist relations of production—defined broadly in terms of wage-labour—are undeveloped and agriculture is mostly perceived as providing subsistence in the good years rather than as a commercial endeavour.

9. The statement is true if we except Nizar taluka (8.99%) and Chorasitaluka (7.16%) of Surat district.

In Mangrol and Mandavi talukas production relations show a different picture. Occupational diversification is greater than in Dediapada, though it remains low compared to the diversification achieved by other talukas in the district: the percentage of workers employed in industrial and other occupations is 22 and 18 respectively. The difference in production relations stands out sharply if we compare the proportion of self-cultivators and agricultural labourers in the total workforce of Dediapada and Mangrol-Mandavi talukas. In Mangrol and Mandavi talukas the percentage of self-cultivators is almost half (39 per cent and 48 per cent) the percentage of self-cultivators in Dediapada (68 per cent), while in Mangrol the percentage of agricultural labourers is twice (42 per cent) the percentage of agricultural workers in Dediapada (22.7 per cent).[10]

This brief analysis of the production relations existing in the three talukas captures, like a still picture, the different levels of development achieved by them. Dediapada is the least developed with hardly any signs of commercialisation and a great proportion of self-cultivators; Mangrol is the most developed with a considerable proportion of wage-labour and with clear signs of an incipient commercialization; Mandavi is somewhere in between, closer to Mangrol than to Dediapada.

1.4 Rationale for Dairy Farming among the Tribals

At the national level, the rationale for a new dairy policy and strategy has been clearly stated, based on the official documents of OF and on its evaluation by the World Food Programme, the World Bank and the Jha Committee (George 1986: 1020-1028). It has been the object of fierce controversy leading some participants in the debate to propose "an alternative dairy policy for India, one that we might call "Operation Counter Flood" (George 1987: 1654). There is no need to repeat the arguments all over again.

More relevant for our study are the reasons that motivated the introduction of the NDDB-pattern of dairy farming first in the tribal belt of Surat, and later in Bharuch district. The adoption of this type of dairy farming has been the result of a *convergence of various interests* in this area (Anand and Savara 1985:145-6; Baviskar 1986: 8-11 and 30-32). The interested parties range from the government to the tribals themselves.

From the government's point of view, the new strategy of dairy farming falls under the asset-component part of the Integrated Rural Development Programme (IRDP); after all, there are not very many assets

10. In Mandavi the percentage of agricultural workers is 29%.

that can be distributed among the landless poor. Some writers have even claimed that "as a rural development programme Operation Flood has been acclaimed as by far the largest and most successful" (Acharya and Huria 1986: 1652). In addition, during the Fifth Five Year Plan, the central government decided to increase the financial allocation for programmes directed exclusively at improving the economic condition of the tribals, and hence the tribal sub-plans came into existence. In many states, Tribal Development Corporations (TDCs) were set up to implement and monitor these plans. In Gujarat, the TDC was set up in 1972 to obtain financial assistance from commercial banks for promoting gainful employment among the tribals. Dairy farming has been the most favoured programme. Until June 1980, the financial assistance extended by the public sector banks to the Gujarat TDC was Rs. 550 lakhs, and 92 per cent of all beneficiaries had been given assistance for the purchase of milch animals (Bank of India 1981: 19).

Public sector banks have been directed to play a greater role in government-sponsored development programmes by providing credit, especially to the weaker sections of society. The banks perceived the financing of the dairy scheme for tribals as a way to fulfil their obligation. Under the dairy scheme promoted by the Gujarat TDC,

> each beneficiary is given a loan not exceeding Rs.2,500 for the purchase of a buffalo; since the beneficiaries (tribals) belong to the weaker sections of society, the loan is covered under the DRI scheme which carried a concessional interest rate of 4 per cent; the state government has agreed to pay 50 per cent subsidy to each beneficiary which is adjusted against recovery of loans; in other words, the repayment of 50 per cent of the dairy loan is recovered through the subsidy; the remaining 50 per cent of the loan is to be repaid by the beneficiaries in easy instalments spread over four years (Bank of India 1981: 22).

There was another powerful incentive for the banks to collaborate in his scheme. Repayment of loans by the tribals was made easier for two easons: *first*, SUMUL's readiness to buy all the milk from tribal members t reasonable prices ensured a steady flow of income; *second*, the milk ooperatives which have been studied in this book were supported by well stablished voluntary organisations that could and did provide institutional uarantee for the repayment of the loans. Small wonder the banks were nterested in fostering dairy farming among the tribals.

The top tier in the dairy cooperative structure composed of the National airy Development Board (NDDB), the Indian Dairy Corporation (IDC), he Gujarat Cooperative Milk Marketing Federation (GCMMF)[11] and the

District Union Cooperatives like SUMUL, were determined to increase production for the national milk grid. This, they felt, is needed to meet the rapidly increasing demand for milk. K.N. Nair and M.G. Jackson estimate that the demand for milk will be 57 million tonnes by the 1990s (1981: 2129), while optimistic estimates place the total production in 1985-86 at around 41 million tonnes (IDC 1986: 2). The efforts of SUMUL to raise the procurement of milk are a logical consequence of the new approach.

However, SUMUL's sudden interest in extending its procurement network to the tribal areas of Surat district was motivated by more practical considerations. In 1968, the new milk processing plant set up by SUMUL was commissioned. The initial daily capacity was 50,000 litres; by the early seventies it had risen to 1 lakh litres, and by 1980 it had reached 1.50 lakh litres. In addition to the expansion of the processing capacity, SUMUL had entered into long term contracts to supply 50,000 litres of milk daily to various manufacturers in Bombay and another one lakh litres to the city of Surat, and thereby retain its hold of the city market. Unable to meet these needs and to utilize freely the processing capacity of the plant with the milk supplied by its traditional producers, SUMUL decided "to tap the hitherto neglected tribal talukas in the eastern part, where there was no pre-existing milk supply but a possible potentiality of creating such a supply" (Baviskar, 1986: 22). In 1977, Mandavi, Vyara and Songhad talukas—all predominantly tribal—supplied 7.25 per cent of the total milk procured by SUMUL in the district; by January 1981, their share had risen to 25.4 per cent.[12] From 1977-78 to 1982-83 the buffalo population in the district increased from 87,646 to 1,59,422; an overall increase of 82 per cent.

Many voluntary organisations like the Adivasi Pragati Kendra in Vyara taluka (Baviskar 1986: 40; Verhagen 1986: 19-27), as well as the ones which set up the cooperatives analysed in this study welcomed dairy farming with enthusiasm after having experienced frequent failures in programmes of agricultural innovation. As we shall see in the next section, many of them

11. NDDB was set up in 1965 at Anand as a public trust. Its main goal was to develop the dairy industry in the country following the model of AMUL. The IDC was set up in 1971 at the instance of NDDB to handle all transactions related to receipt and sale of donated commodities as well as to handle the disbursement of funds received under OF I and II (Mascarenhas, 1988: 92). The GCMMF was started in 1973-74 as a marketing federation for all the district unions of Gujarat. Its aims were to avoid competition among the union dairies in marketing milk products; to balance the supply of milk to city customers; to increase the bargaining power of the unions by adopting uniform sale prices for the whole of the Gujarat dairy industry; to coordinate the purchase prices so that the producers' aspirations for higher prices could be contained; to increase the effective utilization of plant capacity; and to provide facilities for research and development of a new product mix (D. Shah 1986: 26-27).

12. Calculated from Table 4 in Anand and Savara, 1985, 144.

became intermediaries between the tribals and the official institutions (banks, SUMUL, insurance companies), and set up an elaborate infrastructure to help the milk producers' cooperatives to develop into efficient organisations.

The process of extending the developmental benefits offered by dairy farming to the tribals was also helped by the view put forward by some social scientists that the poor stand to gain by participating in the new project. Huria and Acharya observed that "the rural poor are certainly more gainfully employed than without dairying" (1980: 1940). Even a highly critical scientist of the OF admitted that "the successful example of a dairy cooperative in Mandal suggests that dairying is a viable alternative for the tribal economy and people; it is true that Mandal is not a typical example; but with some special efforts it is possible to achieve similar results in other villages in the area" (Baviskar 1986: 42). Others went even further in encouraging voluntary organisations to enter the field. "Credit facilities are necessary if the poor and landless groups are to acquire milch animals; [Non-government organisations] NGOs should be put in charge of programmes to organise, educate and help these groups to form cooperatives" (Randeria 1987: 977).

Finally, many tribals have been very eager to accept the dairy programme. The first reason is the subsidy or gift component of the programme: with practical wisdom they decided not to look a gift-horse in the mouth. Secondly, any opportunity for additional income and employment has been quickly seized because of the prevailing poverty and the lack of regular employment opportunities. As Anand and Savara put it: "It is only the extreme economic backwardness of the area and the lack of suitable alternatives, that seem to make the tribals receptive, even eager about dairying" (1985: 157).

It is this interconnected web of various motives and interests that was responsible for the big push received by milk cooperatives among the tribals. In the course of this study, we shall have occasion to review critically these interests and to ascertain whether dairy farming is in the long run a viable alternative for the development of tribal society.

1.5 The Voluntary Sector and Tribal Cooperatives

Voluntary organisations working in the field of development are generally known as Non-Government Development Organisations (NGDO). It is difficult to provide a concise definition of these organisations because

they differ in ideology, objectives and size. One may even distinguish between NGDOs and Action Groups (Fernandes 1984: 215), but for the purpose of this study we may do away with this distinction and define all of them as "private, non-profit voluntary associations working at the local (grassroots) level with and/or for the 'marginalised sections' of society.... and engaged in developmental activities; (they) are legally constituted and frequently receive funds from abroad" (Verhagen 1986: 3). Our study deals with a number of NGDOs performing different roles in the establishment and consolidation of dairy-farming in the tribal belt of south Sujarat. Seven of these were specifically Catholic NGDOs which by 1979 had started Milk Producers Cooperatives (MPC) in that area. In September 1981, another NGDO, the Behavioural Science Centre (BSC), with head-quarters in Ahmedabad, was called in to suggest a programme that could improve the economic performance of the milk cooperatives under their care.

In spite of the impressive infrastructure provided by the NGDOs to many MPCs, the cooperative members had in general received meagre or no benefits. The main reasons for this failure appeared to be insufficient knowledge of the new animal (buffalo), inadequate medical facilities and lack of fodder. The BSC was asked to prepare a preliminary report on the main drawbacks of the MPCs as well as a feasibility study on the alternatives to remedy these problems. The report was completed in April 1982 and the BSC proposed to cooperate with the NGDOs in improving the functioning of the MPCs at two levels: the provision of animal health services, and the design and implementation of a more rational managerial/ administrative set-up.

Table 1.3: NGDOs and their Coverage

Name of NGDO	Place	Taluka	District	No. of villages where each NGDO is already active	has dairy scheme
1. Adivasi Pragati Kendra	Vyara	Vyara	Surat	25	2
2. Adivasi Samaj Seva Kendra	Sagbara	Sagbara	Bharuch	20	12
3. Bharuch Social Service Society	Jhagadia	Jhagadia Valia	Bharuch	161	26
4. Catholic Church	Umarpada	Umarpada	-	35	9
5. Dediapada Social Service Society	Dediapada	Dediapada Valia	Bharuch	53	39 + 4
6. Samaj Seva Sangh Society	Zhankhvav	Mangrol	Surat	45	17
7. Jivan Jyot Social Service Society	Pimpri	Dangs	Dangs	44	16

By January 1982 out of the seven NGDOs referred to, two had decided not to participate in the programme.[13] The remaining five adopted the Animal Health Programme (AHP), but only in the milk cooperatives under Dediapada and Zankhvav was the AHP directly managed by the Behavioural Science Centre.[14]

Our study, therefore, focuses primarily on the economic and social consequences of the AHP on the milk cooperatives established by the Dediapada Social Service Society in Dediapada taluka, and by the Samaj Seva Sangh in Mangrol and Mandavi talukas. Attention must be drawn to the fact that these two organisations have set up two differently structured systems of cooperatives. The former, the Dediapada Social Service Society, started *one* registered MPC covering a number of villages mostly in Dediapada taluka, with a central office located in Nivalda, a village two kilometres away from Dediapada, the taluka's headquarters. The other, the Samaj Seva Sangh set up *different* MPCs in various villages of Mangrol and Mandavi talukas, with a central office located in Zankhvav, a village situated in Mangrol taluka.

1.6 Conclusion

We propose, therefore, to study the socio-economic impact of the BSC's intervention--mainly through the AHP--on a number of MPCs established and managed initially by two NGDOs. The invitation extended to the BSC to intervene in improving the economic performance of the milk cooperatives implies that, under the constellation of favourable circumstances, cooperatives of the SUMUL type are workable instruments for development, but equally, that other inputs not provided by SUMUL are required if the cooperatives are to function as viable commercial enterprises.

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13. Jivan Social Service Society (Pimpri) preferred to set up a separate AHP under a resident veterinary doctor and Catholic Church (Umarpada) opted out of the scheme.

14. In the course of formulating and implementing the programme, the Adivasi Pragati Kendra (Vyara) decided, after an agreement with the BSC, to implement the management of the AHP on its own. This organisation was the first to set up two tribal cooperatives in the area and the latter were already well developed organisations receiving a lot of support from SUMUL (Baviskar, 1986, 22-26). By mid-1984, the viability of the MPCs in Jhagadia was questioned: the members were not interested in the project because Jhagadia taluka had begun to turn into a quarrying centre, providing competitive employment to the tribals. The Adivasi Samaj Seva Kendra of Sagbara took upon itself the supervision of the AHP due to some administrative problems.

GUJARAT

Figure 1.1: Map of Gujarat

Figure 1.2: Map of Bharuch District

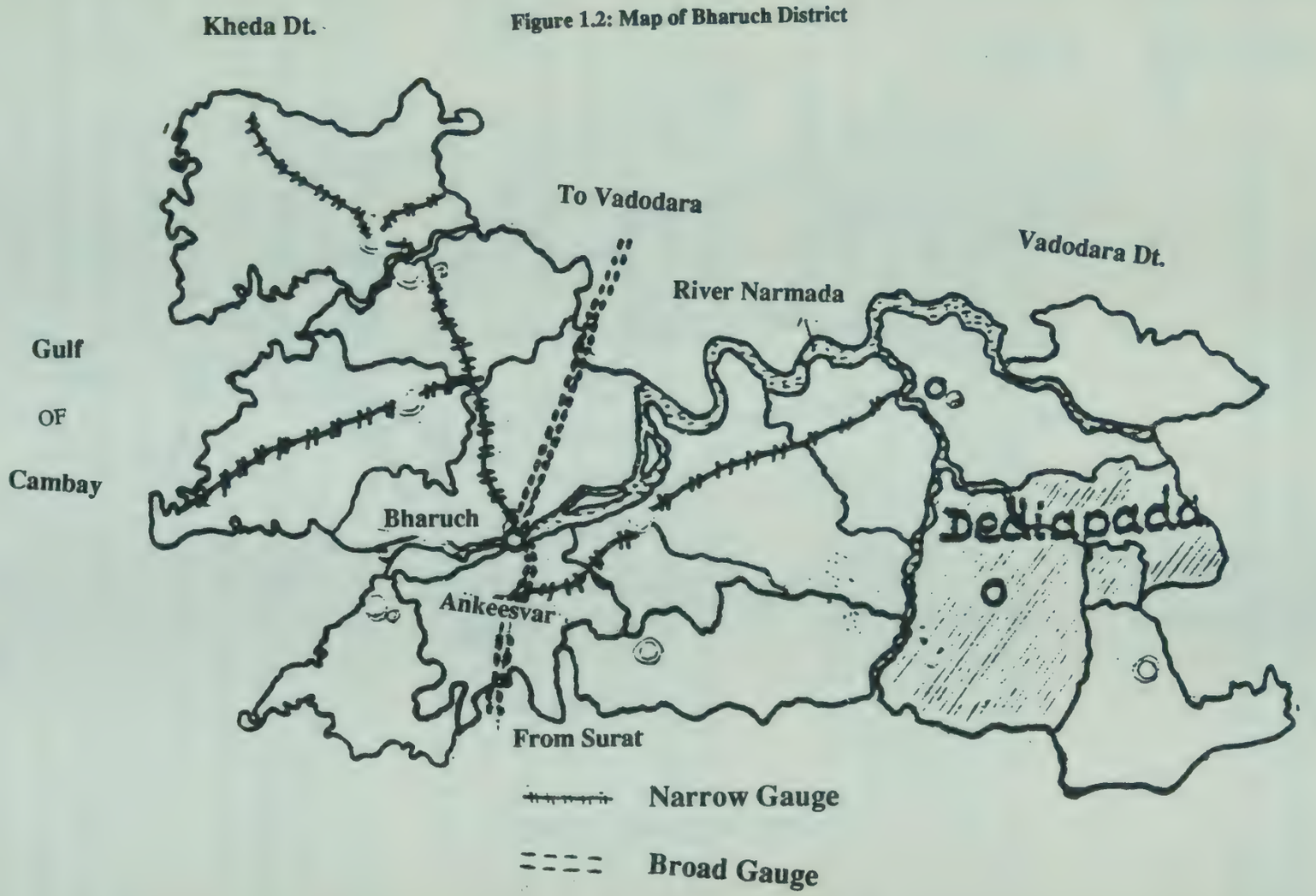

Figure 1.3: Map of Surat District

Chapter 2

Design and Methodology

2.1 Introduction

The entire process of milk procurement and processing in the country is based, as Shanti George has recently remarked, on the lactometer, the machine that tests the fat content of the milk supplied by the producers to the cooperative and by the latter to the Union District Dairy. It has become a telling symbol of the high standards of accuracy and precision demanded by the new dairy industry (George 1986: 963).

One of the effects of using this lactometer has been that the seeds of rational behaviour, and rigour and seriousness regarding the sales of milk have been sown in the minds of the cooperative members. The same author deplores the inconsistency shown by the OF authorities in adopting less rigorous methods to evaluate their own programmes. In attempting to apply rigorous methods of evaluation this chapter hopes to avoid the criticism levelled by Shanti George against the evaluations of Operation Flood.

We would like to emphasize that we have followed as far as possible the methodological recommendations made by Shanti George for this type of evaluation.[1] In following these the study analyses only those villages which have dairy cooperatives and a socially homogenous population (tribals). Furthermore, the study is based on time-series data collected over a period of three years (a longitudinal study including both the flush and the lean seasons). Finally, this evaluation, as the next chapter will show, has been built into the implementation of the project and has proceeded concurrently with it. However, we do not dare to claim that we have succeeded in

1. The suggestions made by Shanti George are as follows: (i) the comparison of villages with and without dairy cooperatives should be avoided, (ii) evaluations should be in-built, concurrent and on-going, (iii) the agency conducting the evaluation should be independent, competent and experienced.

following her last recommendation. The Fellowship Programme in Social Management, the agency which has conducted this evaluation, is a part of the Behavioural Science Centre (BSC). As to its competence, we leave it to the reader to form his own opinion on the basis of this study.

This chapter presents the methodology and design followed in evaluating the impact of the Animal Health Programme (AHP) on the economic viability of dairy cooperatives.

2.2 The Logical Framework Matrix (LFM) Model

The present study has selected the Impact Approach model [2] for evaluating the Animal Health Programme (Imboden 1985: 17-20). This model establishes a hierarchy of aims, and evaluates the impact of the project by analysing its effect on each of the aims specified in the hierarchy. This model has been called the Logical Framework Matrix (Figure 2.1). Its main characteristics are as follows:

1. It defines a set of aims in a hierarchical manner. For easy reference, each one of these aims has been given a name: goals, objectives, purposes, targets, outputs, inputs. We must note that these terms are used in a specialised sense and that their more generalised connotations should not colour their special use here.

2. It formulates hypotheses regarding the causal linkages between one aim in the hierarchy and the next. For example, the model will specify the causal relationship between inputs and outputs, outputs and targets, targets and purposes, and so on.

3. It specifies the assumptions (external influences) or exogenous variables on the basis of which the specified causal links are supposed to operate.

4. It selects indicators which will permit subsequent measurement of

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2. A model is a construct embodying a set of hypotheses. The latter are formulated on the basis of a particular insight into an aspect of reality. Of necessity a model is constructed by abstracting certain elements or features from reality. The model then serves as a tool to analyse reality. With the help of available data the hypotheses are tested; if they are vindicated by the data, the model can be accepted; if they are contrary to the data, the model must be modified or rejected. This process of model formulation and testing expresses the dynamic character of model building in applied research. Models are also used for prediction, but this is not the way in which the term model has been used in the present study.

the impact of one aim on another. Indicators are numerical expressions of the variables used in the model, explaining the relationship between an aim and its realisation. For instance, if the specified aim is to reduce the mortality of buffaloes, the model uses the indicator 'mortality rate' as the numerical expression of a variable (mortality). The behaviour of this indicator will determine the fulfilment or non-fulfilment of the aim.

In this chapter we explain the first four aims in the hierarchy, namely, goals, objectives, purposes and targets. We leave the last two, namely, inputs and outputs to be discussed in the next chapter. Before going further it might be useful to define the first four aims in brief.

The *goal* may be defined as the final end which the AHP must achieve: greater economic viability for tribal cooperatives in South Gujarat.

Objectives are the expressions of the goal at a lower level of abstraction; the achievement of an objective contributes to the attainment of the goal. The economic performance of a cooperative (the goal) depends directly on its milk output and productivity. The objective of the project is to increase milk yield and productivity through improved animal health services.

Purposes are operationalised objectives that have to be fulfilled in order to achieve the goal. In the present context the purposes are (i) to increase herd build-up in the long run and (ii) to increase the number of animals "in milk" in the short run.

Targets are a set of concrete and quantifiable aims that have to be achieved to attain the purposes. The target of the AHP is to improve nutritional standards, reduce herd mortality, shorten dry-periods and improve breeding.

A schematic presentation of the LMF is shown in Figure 2.1. This figure displays the hierarchy of aims and the causal linkages between them. The indicators considered under each aim, namely, goals, objectives, purposes and targets are also presented in the figure.

2.3 Definition of Indicators

The attainment of the four aims discussed above is measured by

a set of indicators. This section deals with the indicators corresponding to each of the aims. For easy reference they are presented in Appendix 2.1.

2.3.1 Goal Indicators

Recent studies on the specific nature of cooperatives emphasize their dual role. As 'institutions' they have a role to fulfil inasmuch as they stand for a set of values like equality, the prosperity of each member, his participation in running the cooperative, local leadership and self-regulation. As enterprises, the cooperatives must generate a surplus which can be invested for its development, expansion and diversification (Seetharaman and Mohanan 1986: 9-10).

This study deals mainly with the evaluation of the enterprise-aspect of the cooperative and underlines, wherever it arises, the clash between the institutional and entrepreneurial goals. More specifically, it analyses the generation of the surplus at the level of each member (increase in income), and at the level of the enterprise (increase in accumulated capital and fixed assets). The latter aspect will also throw some light on the means used by the cooperative to generate this surplus and on the areas where investment has occurred. We may also note that though we have not dealt directly with the cost structure due to the difficulty of calculating the cost of imputed labour, we have, nevertheless, used available data occasionally to draw certain inferences regarding cost.[3] In short, the goal of the AHP is to improve the economic performance of these tribal cooperatives by raising the income of their members and increasing the capital and assets of the enterprises. The following three indicators have been used to measure this goal:

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3. This study refers to the following types of costs:

(i) administrative costs that go into the maintenance of a central cooperative office. The magnitude of this cost has been measured by comparing the price received by the cooperative from SUMUL with the price paid by the cooperative to the members. The difference between these two prices indicates the extent of this cost for each cooperator.

(ii) The cooperator must repay the loans received from the banks towards the purchase of the buffalos. This interest-cost is also dealt with in this study since the repayment is made by deducting the corresponding amount from the monthly payment he received from the cooperative.

(iii) Production costs include expenditure on concentrate feed, other types of fodder, health services etc. As regards concentrate feed, the study specifically calculates the monthly expenditure on it by each cooperator. The study measures also the value of agricultural by-products used by the cooperators as cattle feed. We may note that agricultural by-product is one of the most important components of animal feed in tribal areas. No specific mention is made of labour costs because of the difficulty in estimating its imputed value.

Consumable monthly income per milk-supplying cooperator (G1)

$$G1 = \frac{\text{Net income from sale of milk to the cooperative}}{\text{Total number of milk-supplying cooperators.}}$$

Capital accumulation per cooperator (G2)

$$G2 = \frac{\text{Value of share capital + reserve funds +accumulated profits}}{\text{Total number of cooperators}}$$

Fixed assets per cooperator (G3)

$$G3 = \frac{\text{Total value of fixed assets}}{\text{Total number of cooperators}}$$

Indicator G1 measures the economic performance of the cooperative from the point of view of the individual cooperator. In the definition of G1, consumable income implies the amount of *cash* received by the cooperator which can be used for immediate consumption. In the formula of G1, net income denotes income net off all deductions including office expenditure and loan repayment. The term 'milk-supplying cooperator' refers to an individual member of the cooperative who supplies milk during a specified period of time. In the case of Dediapada, the term 'cooperator' includes milk suppliers who are not actually members of the cooperative. This has been done for purposes of convenience since they constitute a meagre 2 per cent of all milk suppliers.

Indicators G2 and G3 measure the long-run economic performance of the cooperative as an enterprise. They reflect the capacity of the cooperative to extract savings from its members and reinvest them. An increase in indicator G1 at the cost of G2 and G3 implies that the objectives of the cooperative as an enterprise may still be achieved as long as there is no serious dis-investment with long-term effects. On the other hand, an increase in the cooperative's assets, namely G2 and G3, at the cost of the cooperator's income (G1) militates against the aim of the cooperative as an institution with a social goal.

2.3.2 Objective Indicators

The economic goal of the milk cooperatives will be achieved when its assets and the income accruing to its members increase. The proceeds received from the sale of milk to SUMUL and the income received by each member of the cooperative depend on the quantity and quality of the milk. This is so because the price of milk (per kg. of fat) is fixed by SUMUL; in this sense, the price of milk is considered in the model to be a pre-determined (given) variable. The cooperatives do not have control over the price and in this sense they cannot use it to raise incomes.

Sale proceeds and income changes will, therefore, depend on the fluctuations of milk output and productivity as well as on the quality of milk. Preliminary comparisons of the weighted fat percentage of various cooperatives revealed that the differences among them were very small and insignificant. We decided, therefore, to drop this indicator from the model. Our study, then deals only with the effects of changes in milk output and productivity on income.

Productivity can be measured in terms of each animal or in relation to each cooperator. The former defines a yield per animal and it corresponds broadly to the 'yield per hectare' used in agriculture. Further, productivity per animal is estimated in two different ways: (i) the yield per milch animal, when the entire stock is taken into consideration, and (ii) the yield per in-milk animal, when only the animals in-milk are considered.[4] Productivity per cooperator expresses the cooperator's ability to manage milk production efficiently, especially if he has more than one animal. In this study, we estimate productivity per cooperator in two different ways: (i) those cooperators who have supplied milk during a month, and (ii) all cooperators. The following is the list of objective indicators:

Milk output (OB1)

OB1 = Amount of milk (in litres) sold by the cooperatives during one year to SUMUL

Average yield per Animal in Milk (OB2)

$$OB2 = \sum \frac{Q_i}{n_i} \quad (i = 1,2 \ldots 12)$$

4. The same type of indicators have been used in other studies: Nair 1979: A-25 to A-31; Dorsten 1985: 26; Rajapurohit, 1979: A-16.

where,

Q_i = Amount of milk (in litres) sold to SUMUL during the ith month

n_i = Total number of in-milk animals during the ith month.

Note that OB2 measures the average yield per year since it is the addition of monthly average yields.

Average yield per Milch Animal (OB3)

$$OB3 = \sum \frac{Q_i}{N_i} \quad (i = 1, 2, \ldots 12)$$

where,

Q_i = Amount of milk (in litres) sold to SUMUL during the ith month

N_i = Total number of animals in the ith month

Note that OB3 measures the average yield per year since it is the addition of monthly average yields.

Average yield per Cooperator (OB4)

$$OB4 = \sum \frac{Q_i}{C_i} \quad (i = 1, 2, \ldots 12)$$

where,

Q_i = Amount of milk (in litres) sold to SUMUL during the ith month

C_i = Number of cooperative members at the end of the ith month

Average yield per Milk Supplying Member (OB5)

$$OB5 = \sum \frac{Q_i}{S_i} \quad (i = 1, 2, \ldots 12)$$

where,

Q_i = Amount of milk (in litres) sold to SUMUL during the ith month

S_1 = Average number of milk supplying members; this is calculated by dividing the number of members who have supplied milk in a month by 30

Milk sales per Cooperator (OB6)

$$OB6 = \frac{\text{Value of monthly milk sales to the dairy}}{\text{Total number of cooperators}}$$

Milk purchase per cooperator (OB7)

$$OB7 = \frac{\text{Value of monthly milk purchased by the cooperative from the members}}{\text{Total number of cooperators}}$$

Monthly milk yield per inter-calving period (OB8)

$$OB8 = \frac{\text{Milk output during two consecutive calvings}}{\text{Length of the corresponding inter-calving period measured in months}}$$

2.3.3 Purpose Indicators

They refer to the variables (indicators) which determine the achievement of the objectives. In other words, if the behaviour of the purpose indicators is positive then we should expect a positive impact on the objective variables (indicators). The model distinguishes between two types of purpose indicators: (i) those which increase output and productivity (objectives) *in* the *short run* and (ii) those that affect output and productivity in the *long run.*

Long-run Purpose Indicators

Replacement Rate (P1)

$$P1 = \frac{\text{Total number of } \textit{female} \text{ calves at the end of the year}}{\text{Total number of animals at the beginning of the year (opening stock)}}$$

Current Season's Calving (P2), (P3)

$$P2 = \frac{\text{Total number of calves (male } \textit{and} \text{ female) born during the year}}{\text{Total number of animals at the beginning of the year (opening stock)}}$$

$$P3 = \frac{\text{Total number of calves (male } \textit{and} \text{ female) born during the year}}{\text{Total number of animals at the end of the year (closing stock)}}$$

Male Calves Rate (P4)

$$P4 = \frac{\text{New male calves born during the year}}{\text{Total new calves born during the year}}$$

It is important to underline the difference between the replacement rates and the current season's calving. The former refers to the total number of female calves in the herd at the end of a given year, whether they have been born in the cooperative during that year or not. What the indicator measures is the future reproductive capacity of the herd. The latter measures the reproductive capacity of the adult female stock (the 'delivery rate') within a single year.

The inclusion of P3 and P4 as variants for measuring current season's calving is motivated by a particular problem encountered in Dediapada cooperative, to be dealt with in Chapter 4.

Short-run Purpose Indicators

In-milk rate (P5)

$$P5 = \frac{\text{Total number of in-milk animals (pregnant } \textit{and} \text{ non-pregnant) in a month}}{\text{Total number of animals at the beginning of the year (opening stock).}}$$

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In recent studies (Nair 1985: A-86 to A-95) the importance of the in-milk rate in affecting milk output has been underlined. In these studies the term 'in-milk rate' is also called *the breeding efficiency*. We shall use both terms interchangeably.

2.3.4 Target Indicators

These indicators specify a set of concrete targets that have to be achieved so that the purposes are fulfilled. In other words,they are quantitative measures of variables influencing the short-term purpose indicator (in-milk rate) and the long-term purpose indicators (the replacement rate and the current season's calving).

Target indicators have been divided into four broad groups:

1. Herd mortality
2. Breeding practices
3. Breeding behaviour
4. Nutritional standard of the herd.

A. Herd Mortality

The mortality of animals influences decisively both the replacement rate and the current season's calving. Mortality has been measured by the following three indicators:

Mortality Rate (T1)

$$T1 = \frac{\text{Number of animals which died in a year}}{\text{Opening stock + new animals added during the year}}$$

Female Calf Mortality Rate (T2)

$$T2 = \frac{\text{Number of female calves which died in a year}}{\text{Opening stock + calves born in the year + new calves bought in the year}}$$

Vaccination Rate (T3)

$$T3 = \frac{\text{Total number of vaccinations given in a year}}{\text{Total number of animals at the end of the year}}$$

B. Breeding Practices

The term "breeding practices" describes three concrete activities undertaken by the Trained Village Workers (TVW),[5] the supervisors and the doctor to reduce the number of dry animals in the herd as well as to shorten their dry period. We must clarify that the indicators measuring these three activities reflect or evaluate directly the ability and efficiency of the TVWs in performing these practices. These indicators measure also the breeding patterns of the herd inasmuch as we would expect, for example, that the number of pregnancies reported by the TVWs be equal to the actual number of pregnancies in the herd. In short, the value of these indicators, especially the first two, do not refer directly to the actual but to the reported situation of the herd. The three indicators measuring breeding practices are as follows:

Breeding Rate (T4)

$$T4 = \frac{\text{Number of inseminated animals in a month}}{\text{Total number of non-pregnant animals in a month}}$$

Pregnancy Rate (T5)

$$T5 = \frac{\text{Number of pregnant (in-milk + dry) animals}}{\text{Total number of animals (opening stock)}}$$

Dry, Non-breeding Rate (T6)

$$T6 = \frac{\text{Dry animals which are non-inseminated}}{\text{Total number of animals (opening stock)}}$$

C. Breeding Behaviour

The breeding behaviour of an animal is mainly determined by the age

5. The functions of the TVWs will be explained in the next chapter.

at which the first calving takes places and by the length of the time between two successive calvings. Changes in breeding behaviour will affect the short-run and long-run purpose indicators.[6] A reduction in the age at the first calving will increase the wet period of the animal as well as the number of calvings. A shortening of the inter-calving period will tend to increase the number of calvings during the productive life of the animal as well as to reduce the dry spell commonly associated with a long inter-calving period. The breeding behaviour is measured with the help of the following two indicators.

Age at First Calving (T7)

T7 = Average age (in months) of all animals at the time of their first calving during a given year

Inter-calving Period (T8)

T8 = Average interval (in months) between two successive calvings for those animals that have calved during a given year.

D. Nutritional Standard of the Herd

The quality and quantity of feed available influences the milk yield as well as the herd build-up. This study has chosen the following indicators to measure the nutritional standard of the animals belonging to these cooperatives.

Sale of Concentrate Feed (T9), (T10)

$$T9 = \frac{\text{Value of monthly sale of concentrate feed}}{\text{Total number of buffalo-units at the beginning of the month}}$$

6. Genetic improvements have an important effect on breeding behaviour and ultimately on milk output and productivity. Cross-breeding of non-descript cows has become one of the main goals of OF II. Cross-breeding of buffaloes is not used because "the best breeds are already present in India and cross-breeding would not therefore yield spectacular results. Any breed improvement would have to come through selective breeding" (Acharya and Huria 1980: 1931). Selective breeding is rarely utilized in the tribal cooperatives dealt with in our study.

$$T10 = \frac{\text{Value of monthly sale of concentrate feed}}{\text{Total number of cooperators in a month}}$$

Surplus Feedstock per buffalo-unit (T11)

$$T11 = \frac{\text{Value of the grain surplus from the previous season + Value of agricultural by-products used to feed cattle during one year}}{\text{Total number of buffalo-units in a year}}$$

Grazing Land per Buffalo-Unit (T12)

$$T12 = \frac{\text{Total available grazing land (acres)}}{\text{Total number of buffalo-units}}$$

The concept of "buffalo-unit" has been used to take into consideration the difference in feeding capacity between the young and adult buffaloes. Four young animals equal one standard buffalo-unit.

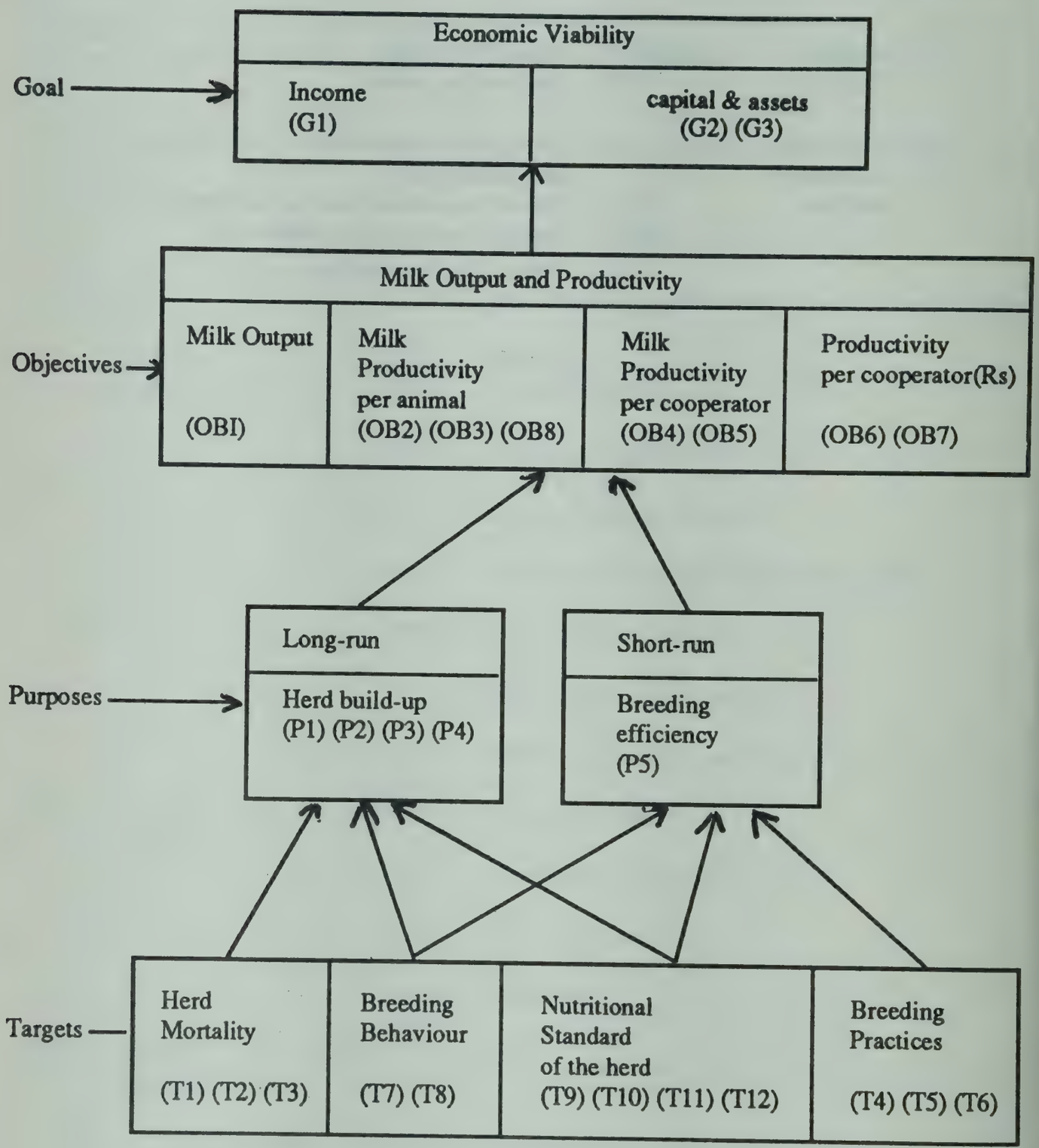
APPENDIX 2.1

LIST OF INDICATORS

Sl. No.	Framework Matrix	Code	Indicator
I	Goal Indicators	G1	Consumable monthly income per milk-supplying cooperator
		G2	Capital accumulation per cooperator
		G3	Fixed assets per cooperator
II	Objective Indicators	OB1	Milk output
		OB2	Average yield per animal in-milk
		OB3	Average yield per milch animal
		OB4	Average yield per cooperator
		OB5	Average yield per milk-supplying member
		OB6	Milk sales per cooperator
		OB7	Milk purchase per cooperator
		OB8	Monthly milk yield per inter-calving period
III	Purpose Indicators	P1	Replacement rates
		P2, P3	Current season's calving
		P4	Male calves rate
		P5	In-milk rate
IV	Target Indicators		
	A. Herd Mortality	T1	Mortality rate
		T2	Female calf mortality rate
		T3	Vaccination rate
	B. Breeding Practices	T4	Breeding rate
		T5	Pregnancy rate
		T6	Dry, non-breeding rate

Sl. No.	Framework Matrix	Code	Indicator
	C. Breeding Behaviour	T7	Age at first calving
		T8	Inter-cavling period
	D. Nutritional standard of the herd	T9	Sale of concentrate feed per buffalo-unit
		T10	Sale of concentrate feed per cooperator
		T11	Surplus feedstock per buffalo-unit
		T12	Grazing land per buffalo- unit

Figure 2.1: Logical Framework Matrix



Chapter 3

Nature and Management of the AHP

3.1 Introduction

Cooperatives may be regarded not merely as enterprises with economic objectives but also as institutions playing a social role. Keeping this firmly in mind, the Behavioural Science Centre (BSC) introduced an Animal Health Programme (AHP) which would facilitate the simultaneous realisation of both the economic and the social goals.

In concentrating on the AHP's involvement with education, this chapter explains how its pedagogy has a distinct social purpose: to impart certain skills and, while transferring technology, to create a cadre of people with organisational and managerial abilities. The organisation of this cadre acts as a model for the community to organise itself. This calls for an analysis of the last two aims of the Logical Framework Matrix, namely, *inputs* and *outputs*. Inputs constitute the educational package offered by the BSC to selected Trained Village Workers (TVWs), while outputs are the services provided by those same TVWs to the village community. These inputs and outputs are described in some detail.

The chapter also describes the Management Information System (MIS) which holds the inputs and outputs in a symbiotic relationship. The education received through the inputs flows out through the TVWs in the form of services. These services or outputs in turn generate information which is used to modify the educational input. The MIS thus acts as a channel within which inputs and outputs continuously modify each other.

3.2 The Behavioural Science Centre and the AHP

As mentioned in Section 1.4, the BSC's intervention took the form of an

Animal Health Programme because it judged the poor economic performance of the cooperatives to be rooted in very low productivity per animal. In some cases the average milk-yield per day was not much more than a litre.[1] Poor knowledge of health-care, malnutrition, and non-availability of timely veterinary services led to a high incidence of calf-mortality and to a low level of buffalo productivity (Anand and Savara 1985: 151).

The Non-Governmental Development Organisations (NGDOs) running the milk coooperatives had gone to great lengths to establish the necessary administrative infrastructure required for dealing with the existing problems. They had set up central offices which performed specific functions such as (i) collection of milk from individual members at appointed collection centres; (ii) fat-testing of individual milk samples; (iii) transportation (Dediapada only)[2] and sale of milk to the Union Dairy; (iv) payment to individual members according to the quantity and quality of milk supplied; (v) purchase of cattle feed, vaccines, medicines and their distribution and sale to the primary milk producer; and (vi) dealing with insurance companies and banks.

Despite these efforts, the milk cooperatives performed poorly and the BSC was asked to intervene. The need for such intervention indicates that Operation Flood, working through organisations like SUMUL or the Indian Dairy Corporation, did not live up to the initial promises regarding supply of inputs. The extent of inadequacy in the supply of inputs (like fodder, vaccines, veterinary services such as artificial inseminations) has been noted by Shanti George who agrees with the comments of the Jha Committee (1984) on this issue:

> We found that the disbursement of funds by the IDC for the federations for the inputs programme up to March 1984 was Rs. 23.47 crore only out of the envisaged assistance of Rs. 108.46 crore . . . the implementation of technical inputs has not been up to the expected level . . . There have been constraints slowing down the efforts to provide health care, upgradation of stock, improvement of fodder availability and other necessary inputs. (1986: 1026)

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1 In Dediapada cooperative the daily average milk-yield for buffalo during 1980-81 was 1.09 litres; in the cooperatives managed by the Samaj Seva Sangh Society in Zhankhvav it was 0.80 litres. (BSC 1980-81).

2. When the milk cooperative started its operations in Dediapada, no Union Dairy had been established in Bharuch district. The milk from Dediapada cooperative had to be transported at the cooperative's cost to Chaswad, a chilling plant located in Netrang, 25 km. away from the cooperative office. The transportation costs from Chaswad to SUMUL (Surat) were borne by SUMUL.

In the light of these constraints the direct intervention of the BSC was sought to tackle these problems. Preliminary discussions between the BSC and the NGDOs of Dediapada and Zhankhvav resulted in a common understanding and restatement of the functions of the cooperatives.[3] These functions relate to: (a) the primary producer or individual cooperator whose interest *vis-a-vis* the Union Dairy (SUMUL) would have to be protected by preserving and increasing his animal wealth and by securing the best price for his milk; (b) the entire cooperative, the assets of which would have to be built up and consolidated by checking the tendency to channelise revenue into non-productive assets like buildings to the detriment of productive ones like fodder and animal health care.

The BSC's responsibility has been to make sure that inputs were provided and that outputs were of the required nature and quality. The inputs consist mainly of training imparted by the BSC to selected persons from among the tribals themselves. Outputs involved the actual provision of health services by these trained persons to the cooperative members.

3.3 Educational Inputs: A Trained Village Worker (TVW) System

The impetus for the animal health programme was to be provided by *education* in two fundamental and related areas: (i) education on animal health and various aspects of buffalo-rearing, and (ii) education directed towards effecting attitudinal changes in the entire cooperative. The latter involves the establishment of good relations between the cooperators and the office staff. Attitudinal changes in the office staff would imply that they work honestly and in the interest of the cooperators; in the cooperators it would mean a change of attitude towards the buffalo which would make them see it as a capital asset that has to be carefully maintained in order to procure positive returns on their investments.

At a more fundamental level the cooperator's perception of himself *vis-a-vis* the environment would undergo a change. From seeing the world as moved and controlled by supernatural forces, he would begin to see the links between material cause and effect and realise his own ability to modify those material causes and thus influence the world. If he were to see causes as

3. For a detailed exposition of the BSC's understanding of the role of cooperatives in the development process see Heredero 1977; Heredero 1989; BSC AR 1980-81, 22-27; BSC AR 1982-83: 16-31; BSC AR 1984: 19-38; BSC AR 1985-87: 13-20.

subject to modification by human beings equipped with appropriate skills, he would gain confidence in his ability to learn those skills influencing the environment, and in his capacity "to deal with situations which require rational decision-making; because the learning would take place in the context of a socio-economic reality, a certain respect for the poorer and disadvantaged among his society would also be instilled" (BSC 1985-87: 21).

At the outset, the BSC had intended to impart training in animal husbandry to *all* cooperative members belonging to various villages. However, it soon realised that this plan was not feasible. To keep track of the work being done by a large number of individual cooperators in several villages would mean time and money on a colossal scale. The cost of the programme would have been prohibitive.

The solution adopted was to concentrate on training selected individuals from each village who would in turn diffuse their skills within the community. These TVWs would be barefoot veterinarians. The immediate need, therefore, was the formation of a TVW cadre.

In this Section we explain briefly the various stages of the training programme (Table 3.1).

Table 3.1: TVW Training Programme

Sl. No.	Training Activity	Time	Duration	Place
1.	Foundation Course	At the start of the programme	3 months	Xavier Research Farm, Mogar
2.	General Education	-do-	10 days	St. Xavier's College, Ahmedabad
3.	Personal Follow-up	Weekly	1 day	TVW's village
4.	Meetings	Monthly	1 day	Coop's Head-quarters
5.	Short/Refresher Course	2-3 times a year	3 days	Fokadi/Vyara Pimpri
6.	Long Refresher Course	After 1-2 years	10 days* 3 months*	Xavier Research Farm, Mogar

* Depending on the need of the TVWs, a ten-day or 3-month course is run.

The *Foundation Course* gives the TVWs fundamental theoretical knowledge on buffalo-rearing; this is complemented by a *general education* programme which does the following:

1. it projects some idea of man and society, and of the role of the family and various economic and political systems, taking care to promote an understanding of the exploitative effects of the present socio-economic structures on tribal society;

2. it encourages reflection upon attitudes and values stressing self-respect, the importance of unity and cooperation, and respect for the TVWs' own people and culture; and directs attention to the exploitative practices of moneylenders and government bureaucrats;

3. it imparts concrete skills in simple arithmetic to prevent the TVWs from being cheated by unscrupulous officials and shows them how to communicate and establish rapport with the cooperators in such a way as to win their confidence and trust.

The general education programme is also intended to make the TVWs more aware of the tribals' difficulties in securing their rights and to prepare them to play an active part in developing a united political voice. It is hoped that this will in turn strengthen their bargaining power *vis-a-vis* the government bureaucracy and help them to obtain the benefits of various government development schemes.

The *personal follow-up* is an important element of the educational strategy in which the *doctor*, a highly-qualified outsider, plays a crucial role. His presence in the villages where the TVWs demonstrate their skills provides support, enabling them to overcome both their initial *diffidence* about transferring learnt knowledge to actual experience, as well as their *fear of rejection* by their people in case of mistakes or failure.

The *monthly meetings* give the doctor an opportunity to transmit to the TVWs a set of values and attitudes such as scrupulous honesty and commitment to the cooperators' welfare.[4] In addition, the doctor's presence at

4. A dishonest TVW can make a substantial additional income at the expense of the cooperator, since in many villages he is the agent who measures the milk to be transported to the Union Dairy and prepares the samples that are to be tested for fat content. An unscrupulous TVW might also demand money for his medical services and, what is worse, prescribe unnecessary medicines and charge extra money for them.

monthly meetings fosters a team spirit among the TVWs. Promoting togetherness, it reinforces a sense of shared purpose, and provides a forum where notes can be exchanged and more support given and received. As a result, there is an increased sense of belonging to a group which makes it easier for the TVWs to learn from their mistakes and to withstand criticism.

The *Short Refresher Course* and *Long Refresher Course* take up for analysis and reflection medical problems that have come up at the monthly meetings and require a more elaborate and systematic treatment. These courses are intended to widen the TVWs' medical knowledge and to sharpen their administrative and accounting skills. The information generated at these meetings is used in the form of feedback into the educational programme.[5]

The project became operational in June 1981 with the training of the first batch of TVWs. It may be useful to note the number of trainees who have attended the training programmes. Up to the end of 1983, the total number of trainees was 85, of whom, by October 1983, 65 were working in the villages distributed area-wise as shown in Table 3.2.

3.4 Welfare Outputs: Provision of Medical Services

The educational programme is intended to provide veterinary services easily accessible to the cooperators, and to change the tribal people's attitudes both towards themselves and towards their environment.

In the section that follows, we attempt to explain in detail the services actually provided by the TVWs from June 1982 to May 1985.

3.4.1 Prevention of Diseases

Among the several methods available for prevention of disease, timely vaccinations have proved to be the most effective. These should be supplied well in advance so as to avoid epidemics leading to death or grave impairment

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5. Any discussion of an educational programme would be incomplete without an analysis of its pedagogy. The novel pedagogy of the educational programme for the TVWs, as developed by Dr. Vijay Sherry Chand, has been discussed in detail in the BSC's *Annual Report*, 1985-87: 21-25). The methods used to implement the educational programme cover two areas: (a) learning new skills related to dairy farming such as milking, vaccination, detection of heat, early detection of diseases, and (b) basic knowledge of counting and arithmetic.

of productive capacity. The TVWs work out logistical problems such as determining the number of vaccines required for a particular period, their transportation from the cooperative office, their proper storage in the village, and their timely distribution. They also see to the actual administration of the vaccines and to the maintenance of medical records. Table 3.3 shows the type of the vaccinations administered by the TVWs.

Table 3.2: Distribution of Trained Village Workers

Cooperatives	Number of TVWs
Dediapada*	20
Sagbara	2
Jhagadia	5
Zhankhvav*	17
Vyara	6
Pimpri	13
Dharampur	2
Total	65

*The cooperatives with which our study is concerned. These 65 do not include persons trained for other societies covered by the AHP, that is, 8 more trainees.

Table 3.3: Vaccinations

Disease	Time	Source of Supply	Remarks
Foot & Mouth	March and September	Union Dairy	Supplied free of cost only by Dediapada cooperative since 1984.
Haemorrhagic Septicemia	May-June	Animal Husbandry Dept. State Govt.	Supplied free of cost
Black Quarters	May-June	-do-	-do-

N.B. In certain areas Anthrax vaccination is also carried out.

3.4.2 Curative Services

Although well-organised Union Dairies make provision for round-the-clock veterinary services to treat sick animals, these services are either not easily available in most villages or are relatively expensive. With their training, the TVWs can tackle about 60 per cent of the medical cases presented to them. Some of the better-skilled TVWs (supervisors) have been so well trained that they can take care of an additional 20 per cent, leaving only very difficult cases to the qualified doctor. This system of training has proved especially useful in times of emergency when prompt attention is essential.

The medical cases treated by the TVWs and the medicines they administer are listed in Appendix 3.1. The entire supply of medicines is planned for in advance. This activity involves estimating the demand for various medicines and their procurement. In order to procure the medicines, the supervisors and the doctor both establish links with the veterinary officer who authorises the supply of medicines and other professional services. Further, they supervise the actual medical usage to ensure that there is no abuse of the medicines supplied, that records are maintained, and that the cost of the medicines is recovered from the owner of the buffalo treated.

3.4.3 Services related to breeding activities

During the breeding season the TVWs are responsible for the following:

(a) *Care of the buffalo bulls.* This has proved necessary since artificial insemination has had only limited success. The TVWs feed these bulls with special concentrates provided by the cooperatives. In order to control and regulate the discharge of semen they keep the bulls tied together.

(b) *Detection of heat* is the only way to avoid long dry periods when the buffaloes are not productive. Special care is taken during the last months of the breeding season since failure to inseminate them during this period may delay lactation for another year. Cowherds are alerted to look out for heat signs especially in those buffaloes which are overdue for insemination.

(c) Wherever there is an Artificial Insemination Centre, the TVWs act as *inseminators.* The semen being from high quality bulls, this facility has led to some genetic improvement in the stock.

(d) *Pregnancy detection.* Following up the services mentioned above, the TVWs carry out Pregnancy Detection Tests to make sure that the buffalo has become pregnant. Should this test prove negative, the buffalo is singled out for treatment before the season is over. Although this treatment is the responsibility of the doctor, the preparatory work and the follow-up are undertaken by the TVWs.

3.4.4 Special Care of New-Born Calves

This service is crucial because calf-mortality tends to disturb the lactation cycle of the mother. *Female* calf-mortality also affects the stability and self-sufficiency of the cooperative (Nair, Jackson 1981: 2130). Calf-care begins during the last two months of pregnancy when the mother is fed with concentrates. This is followed by comprehensive post-natal care described in Table 3.4.

Table 3.4: Measures for post-natal care

Age in days	Feeding	Treatment
1	Colostrum 5 to 7 times	Tincture Iodine on navel
2	-do-	Antibiotic Bolus
3	Colostrum	Deworming dose
7	Milk	Deworming dose
30	Milk	Deworming dose

The training given to the TVWs and the activities carried out by them show clearly that there is now at least one person in the village who has a sound knowledge of modern animal husbandry. Moreover, as these barefoot veterinarians move about attending to the cattle, they answer questions, allay fears, explain the meaning of vaccination, the importance of a high fat percentage, and so on. This is informal education: the efficient transfer of technology outside the classroom. The results are not instantaneous but gradual, and can be appreciated only over a long period of time. The transfer of technology now enters a new stage where it ceases to be a transfer. The new technology has been so appropriated and assimilated into their cultural

universe (*episteme*)[6] that they are now able to modify the received technology to suit the environmental conditions in which the community lives. Any transfer of technology worth the name must ultimately lead to the creation of a new technology. This new technology, in turn, changes the set of cultural beliefs of the tribals. The earlier belief in events as caused by supernatural beings, changes into a new perception involving a critical awareness of the self as an active being who can control and even effect changes in the environment. For instance, disease may be seen as resulting not from evil spirits, but from infection caused by micro-organisms carried by insects that breed in the animal's physical environment.

Although these cultural changes have not been directly measured in this study, in Part B we examine the extent to which the acceptance of the new dairy technology has been diffused within the community and has operated as a stimulus to modify their agricultural practices. What has come over very clearly is that the TVWs' commitment to the cooperator has increased with the progress of the project. Many TVWs have voluntarily taken up the work of dealing with insurance companies and the cooperative offices on behalf of individual cooperators.

Far from being passive victims in the exploitative practices of those higher up in the administrative hierarchy, they now play active, even critical roles. The realisation that they do not have to suffer passively is promoted by the newly acquired skills and the resultant self-confidence. Moreover, their example inspires individual cooperators with confidence in themselves to handle the new technology. Demystification has, in fact, occurred at several levels, and a new world has opened up.

3.5 Management through Monitoring and Dissemination of Information

As mentioned in Chapter 2, the LFM was the method adopted to evaluate the economic impact of the AHP on the cooperatives. The chapter also explained the manner in which causal links operate between the components of the LFM : for instance, *output* (timely vaccination) leading to the

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6. An *episteme* is the "historical a *priori* which, in a given period, *delimits* in the totality of experience a field of knowledge, defines the mode of being of objects that appear in that field, provides man's everyday perception with theoretical powers, and defines the conditions in which he can sustain a discourse about things that is recognised to be true" (Foucault quoted in Merquior 1985: 36).

target (decrease in mortality rate of the buffalo population) leading to the fulfilment of the *purposes* (herd build-up and number of animals in-milk). Both these 'purposes' influence the *objectives* (quality and quantity of milk), thereby achieving the *goal* (increasing the revenue accruing to the cooperative).

These causal links generate specific information relating to each interacting component of the AHP. The flow of information might work, for instance, like this: There has been an increase in the mortality rate (target) due to the TVWs' supposed inefficient implementation of the vaccination programme (output). Further questioning reveals that the TVWs have in effect carried out the vaccination programme as they were told to do. This information then leads to a basic questioning of the educational input itself. A modification of this input leads in turn to improved services (output) which influence the herd build-up, the milk-yield and finally the revenue accruing to the enterprise. The information thus generated can reveal a lacuna at any level of the LFM.

On the other hand, improved services and positive results reinforce the educational input and increase confidence in the TVWs. Positive reinforcement at monthly meetings leads to increased motivation and commitment, which in turn generate better services, increasing the revenue accruing to the cooperative.

It is the *monitoring system* which captures and channelises this information. The dynamics it creates between various levels of the LFM leading through information and feedback to a process of constant re-checking, re-thinking, re-learning and re-evaluation makes the monitoring system an indispensable tool in the management of the AHP. It is evident that monitoring is not something extraneous but in-built into the technical activities of the project (Anthony 1965).

In this study, the specific term "Management Information System" (MIS) is used to refer to the integrated system that monitors information needed to plan and control the AHP (Patel 1979). The specific nature of a particular MIS depends on the nature of the organisation set up by a project, that is, on the different management levels of a project. The organisational set-up and the various managerial functions of the AHP are represented in Fig. 3.1. The right-hand side shows the links that join the cooperator to the network of cooperatives belonging to the Union Dairy (SUMUL). The

left-hand side depicts the organisational structure of the project. To understand this structure we need to distinguish three levels of management:

Top Management is represented by the Director of the Project who is also the Director of the BSC, assisted by the Director of the Xavier Research Farm (XRF).[7] He is responsible for coordinating the various activities of the agencies involved in the project (the BSC, the XRF, the Gujarat Agricultural University, and the NGDOs) so that the objectives and goals of the project may be clearly defined and implemented. The Director is accountable to the funding agencies and to the NGDOs that sought his intervention. The specific information needs at this level are of two kinds: first, overall summaries of data, to compare the *actual* direction of the project with its main goals; second, presentation of main trends to assess achievements and failures, which can be easily incorporated into progress reports to be submitted to the various funding agencies. At this stage of the project, such reports are necessary to enhance the credibility of the BSC with the funding agencies.

Middle Management is represented by the doctor and, at times, by the educational wing of the BSC involved in training the TVWs. They are responsible for making the general goals of the project operational and for designing the most appropriate training programmes for the TVWs. Information at this level is needed in order to control the performance of the supervisors and the TVWs; to ensure that the educational inputs have been understood and put into practice; to plan and evaluate all the activities related to educational inputs, and to prepare feasibility studies on concrete problems arising in the field such as non-availability of fodder. The doctor deals with the cooperators when necessary, and with the cooperative's central offices which handle and distribute medicines, vaccines and other technical components.

Junior Management comprises the junior technical assistants who are responsible for the day-to-day running of the project. The information needed at this level requires results to be presented in a very disaggregated manner and related to the concrete problems of the specific areas. The exchange and flow of information at this level must be primarily education-oriented. The technical assistants deal directly with the cooperators and with the village

7. The BSC's original task was confined to mobilising the necessary finances for the project and to helping the XRF plan and implement the educational programme. As the project progressed, new needs were detected, and the educational strategy was changed; the responsibilities of the BSC increased, while the role of the XRF became less prominent.

offices. When necessary, they also mediate between the cooperative office and the cooperators.

Clear lines of responsibility exist between the three levels of management. Each level is accountable to the persons at the level above and to the persons at the level below. For instance, the TVW is accountable to his supervisor as well as to the individual cooperators who trust him.

An effective MIS must take into cognisance the different levels of the organisational structure because each level has its specific and changing information requirements. The MIS must be capable of satisfying these needs. It is natural, then, to find that, from 1982 to 1985, the MIS evolved continuously in response to these changing needs and priorities. In what follows we briefly explain the various stages through which the MIS has passed.

First Stage: MIS to Build up Credibility

At the beginning of the project (May 1982), a *card system* was designed to provide information on the buffalo population covered by the project. A card for each buffalo had to be filled out with the necessary information by the TVW in charge of the animal. The technical assistants supervised the card-filling at the village level. Monthly summaries were prepared from the cards by the TVWs, and later aggregated into area-wise tables which were systematically discussed at the monthly meetings of the project staff.

At this stage, the primary aim of the MIS was to establish credibility with, first, the cooperator, explaining to him the benefits of the project; second, the NGDOs; and third, the funding and other agencies, providing them with a periodic set of reliable data about the project.

Second Stage: MIS as an Educational Tool

By the middle of 1983, an important change had taken place in the project: the monitoring system came increasingly to be seen as an educational tool. A new principle was accepted—whatever information/data came from the village must return to the village in the form of an educational input. Information must benefit the cooperator who generated it; this means that it must reach him in an easily understandable format.

To fulfil this need, the format of the monthly reports prepared by the TVW was changed so that the buffalo population in the village could be viewed from an economic angle, i.e. as productive or unproductive, and the reasons for this productivity or otherwise easily identified. The new format emphasises the difference between buffaloes in-milk *and* pregnant (productive now and in the future), and buffaloes in-milk but *not* pregnant (productive now, but not in the future). In the case of empty (non-pregnant) animals, the distinction between inseminated and non-inseminated points to the real cause of present or potential unproductiveness and indicates the concrete action to be taken to remedy matters. The difference between the two monthly formats shows that the design of the MIS should vary according to the changing aims.

This new approach was also reflected in the format prepared for the area-wise summaries. The same productivity criterion used at the village level was retained, and information regarding income and its distribution was added. This latter kind of information taught the TVWs the extent of the economic gain accruing to the village and the number of cooperators benefiting from it.

The stress on the educational goals of the MIS also made the monthly meetings with the TVW more crucial. The meetings usually began with a brief summary of the previous month's statistics presented by the doctor. The TVWs were compelled to look for concrete reasons to explain the data. During these discussions, the doctor was able to check the accuracy of the data collected. Equally important, the TVWs began to see causal connections between their own activities, the cooperators' activities, and the present state of the buffalo population. Evaluating past results naturally led to planning for the coming month. Monitoring and evaluation, therefore, came to be seen as an integral part of planning. This continuous educational process imparted an understanding of basic managerial skills (planning, monitoring and evaluation) as well as knowledge regarding diagnosis and treatment of diseases. The assumption underlying this approach is that a real transfer of technology can only take place when the causal link between input and output is clearly perceived by the people concerned. It is this understanding that will enable them to use the new technology effectively.

Third Stage: MIS as a Formal Instrument of Planning

By the middle of 1984, the credibility of the project had been established. As the data generated by the project became more and more technical,

the funding agencies and the NGDOs practically stopped sending in their comments on the information provided to them. The MIS became, more and more, an integral part of the planning mechanism of the cooperative. It became indispensable for planning new animal health camps, organising preventive measures, upgrading certain skills, checking and controlling the activities of the TVWs. Figure 3.2 depicts the flow of information and the feedback processes within the project.

The conception of the MIS as an integral part of planning highlighted its function as a controlling mechanism. This set of *controls* depends essentially on adequate, relevant and reliable information. A comparative analysis (Figure 3.1) throws light on the varied nature of information required for setting up these controls. Disaggregation is greatest at the TVW level so that control of individual TVWs becomes possible. Before aggregating the data in order to present it at a higher management level, its reliability is checked at the monthly meetings. During 1985, the project Director undertook a painstaking check of village level records and arrived at the conclusion that the primary data collected by the TVWs were extremely accurate and reliable. These data have formed the basis of the present economic evaluation.

3.6 Characteristics of the Data

A final clarification is required regarding the sources from where data for various indicators has been collected and the size of the sample used.

Data for indicators G1, G2, G3, OB1, OB2, OB3, OB4, OB5, OB7, T9 and T10 have been collected from the records kept in the central offices of Dediapada and Zhankhvav cooperatives. Data for indicators P1, P2, P3, P4, T1, T2, T3, T4, T5 and T7 were generated in the course of the project by the MIS and were kept with the officials of the AHP. Data for indicators OB8, T7 and T8 were specially prepared for this study with the help of the data-base generated by the MIS; these data contain a list of all female buffaloes, their date of birth (or the date in which they were brought into the cooperative), their calving dates, and the milk output obtained during the intercalving period. Data for indicators T10 and T11 were specifically collected for this study from the cooperative members and the village panchayat respectively.

The sample size for various indicators has been determined as follows (See Appendices 3.2 and 3.3):

(i) In Dediapada, data for T1, T2, T4, T5 and T6 were collected from nine out of twenty-seven villages belonging to Dediapada cooperative. In each of the nine sampled villages the data collected covers the entire buffalo and cooperator population of the village. In Zhankhvav, data for these indicators are of a census type, that is, they have been collected from all the cooperatives (villages) managed by the central office.

(ii) Data regarding T7 refer only to the buffaloes born in the cooperative. In most cases it was not possible to determine confidently the age of the adult buffaloes bought by the cooperative.

(iii) Data regarding the remaining indicators for both Dediapada and Zhankhvav cooperatives are of a census type covering the entire population of buffaloes and cooperators.

APPENDIX 3.1

LIST OF MEDICAL CASES TREATED BY THE TVWS

Sl. No.	Medical Case	% of affected animals	Remarks
1.	Simple Indigestion	24	
2.	*Tympany (Bloat)*	12	Common during early part of monsoon
3.	Impaction of Rumen	10	Severe cases require a doctor
4.	Oral Injuries	8	Common during the dry season
5.	Enteritis	8	
6.	Bovine Surra	6	Medicine kept with supervisor
7.	Hoof Injuries and Complication	42	Very common during the monsoon.
8.	Mastitis/Teat injuries	8	Prompt treatment maintains milk yield.
9.	Milk let down problems	5	-do-
10.	Dystocia (Malpresentation of foetus)	1.8	Prompt correction saves mother and child
11.	Retention of placenta	3	Prompt treatment avoids future reproductive problems
12.	Prolapse of uterus	2	
13.	Mineral Deficiencies and Anemia	15	Nutritional deficiencies parasitic anemia
14.	Accidents, horn injuries-minor abrasions		Sporadic occurrence
15.	Systematic Disturbances-Toxomia (Toxomia), Milk Fever, etc.		Sporadic occurrence

List of Medicines supplied by TVWs

1. Tincuture Iodine
2. Tincuture Benzoin
3. Turpentine Oil
4. BHC Powder
5. Dressing powder
6. Antiseptic solution
7. Magnesium solution (sulphate)
8. Sodium Bicarbonate
9. Tonic Mixtures
10. Astringent powders
11. Oxytocin ampoules
12. Antibiotic boluses (Treatment of calf diarrohea and uterine problems)
13. Mineral mixtures
14. Deworming agents (for calves)

APPENDIX 3.2

DISTRIBUTION OF THE SAMPLE SIZE (DEDIAPADA)

Sl. No.	Name of the village	Location Code No.	Sample No. 1	Sample No. 2	Sample No. 3	Sample No. 4
1.	Gadh	37		/	/	
2.	Kaltar	38			/	
3.	Gadi	40	/	/	/	/
4.	Bal	41			/	
5.	Arethi	56			/	
6.	Moti Singloti	57	/	/	/	
7.	Nani Singloti	58	/	/	/	/
8.	Khatam	59			/	
9.	Kanbudi	94			/	
10.	Ralda	95			/	
11.	Kokhra Umar	96		/	/	/
12.	Nivalda [a]	98			/	
13.	Sejpur	106			/	
14.	Nighat	110			/	
15.	Medyusag	114	/	/	/	
16.	Gangapur	122		/	/	/
17.	Moti Kalbi	123	/		/	
18.	Mosit	127		/	/	
19.	Bandi Servan	130			/	
20.	Kunbar	133		/	/	/
21.	Pomlapada	135		/	/	
22.	Almavadi	136	/	/	/	/
23.	Khabjidabadh	140			/	
24.	Kharchipada	141			/	
25.	Jargam	149		/	/	
26.	Kevdi	162		/	/	
27.	Kundi Amba	163		/	/	
28.	Kanjai	185			/	
29.	Patdi	186			/	
30.	Chikda	187		/	/	
31.	Ambavadi	189		/	/	
32.	Golvan	191		/	/	
33.	Sherwai	192			/	
34.	Kamodvar	193		/	/	
35.	Idlavi	195		/	/	
36.	Relwa	196	/	/	/	
37.	Sabuti	198		/	/	
38.	Bharada	205			/	/
39.	Juni Ambavadi		/		/	
40.	Kalbi		/		/	
41.	Nivalda [b]				/	
42.	Kamadhenu Sejpur				/	

Sl. No.	Name of the village	Location Code No.	Sample No. 1	Sample No. 2	Sample No. 3	Sample No. 4
43.	Korvi				/	
44.	Devgam				/	
45.	Boridabara				/	
46.	Khajalidabad				/	
	Villages					
	Total no. of Villages	46	10	22	46	9

NOTE

1. Sample 1, of 10 villages has been used to estimate the values of T1 to T6, OB2, OB3 and P1 to P5.
2. Sample 2, of 22 villages has been used to estimate the values of OB8, T7 and T8.
3. Sample 3, of 46 villages has been used to estimate the values of G1 to G3, OB1, OB4 to OB7, T9 to T12.
4. Sample 4, of 9 villages has been used for the entire Part B of the study.
5. Villages from Sl. No. 39 to 46 do not appear in the 1981 Census. For data regarding these villages see Appendix 3.3.

APPENDIX 3.3

VILLAGES COVERED BY DEDIAPAD A MILK-SOCIETY

Sl.	Name of the Village	Location Code No.	Total Population in numbers	Total No. of house-holds	Total Land in hectares
1.	Gadh	37	605	99	1,311.34
2.	Kaltar	38	237	37	88.56
3.	Gadi	40	335	59	990.70
4.	Bal	41	548	78	870.32
5.	Areth	56	360	56	463.71
6.	Moti Singloti	57	293	52	992.14
7.	Nani Singloti	58	652	98	613.95
8.	Khatam	59	292	45	279.22
9.	Kanbudi	94	762	126	821.79
10.	Ralda	95	157	26	491.06
11.	Khokhraumar	96	812	130	563.82

Sl.	Name of the Village	Location Code No.	Total Population in numbers	Total No. of house-holds	Total Land in hectares
12.	Nivalda	98	1,087	136	995.20
13.	Sejpur	106	353	71	250.15
14.	Nighat	110	987	169	408.64
15.	Medyusag	114	..	61	508.86
16.	Gangapur	122	746	131	1,164.84
17.	Moti Kalbi	123	573	96	452.57
18.	Mosit	127	393	61	496.82
19.	Bandi Servan	130	607	100	681.00
20.	Kunbar	133	671	105	465.73
21.	Pomlapada	135	314	70	362.82
22.	Almavadi	136	1,206	212	297.96
23.	Khabjidabdh	140	904	136	503.18
24.	Kharchipada	141	176	38	253.60
25.	Jargam	149	532	103	407.43
26.	Kevdi	162	1,188	197	462.10
27.	Kundi Amba	163	1,057	180	603.78
28.	Kanjai	185	112	23	120.49
29.	Patdi	186	680	134	678.49
30.	Chikda	187	2,378	386	1,345.11
31.	Ambavadi	189	1,511	264	725.03
32.	Golvan	191	147	27	145.81
33.	Sherwai	192	59	15	318.99
34.	Kamodvav	193	627	100	324.91
35.	Idlavi	195	367	57	201.86
36.	Relwa	196	318	57	158.80
37.	Sabuti	198	609	99	375.95
38.	Bharada	205	788	139	275.12

There are eight milk centres which Dediapada cooperative considers as villages, but they are not recorded as such in the 1981 Census. Four of these eight villages are, in all likelihood, hamlets of villages recorded in the Census. Juni Ambavadi belongs to Ambavadi (Sl.No.31); Kalbi to Motikalbi (Sl.No.17); Nivalda [a] and [b] to Nivalda (Sl.No.12); and Kamadhenu Sejpur to Sejpur (Sl.No.13).

The other four villages Korvi, Dergam, Boridabara and Khajalidabaddo not appear in the Census. This explains the fact that in the above table only 38 villages have been recorded as covered by Dediapada milk society.

Figure 3.1: Organisational Set-up

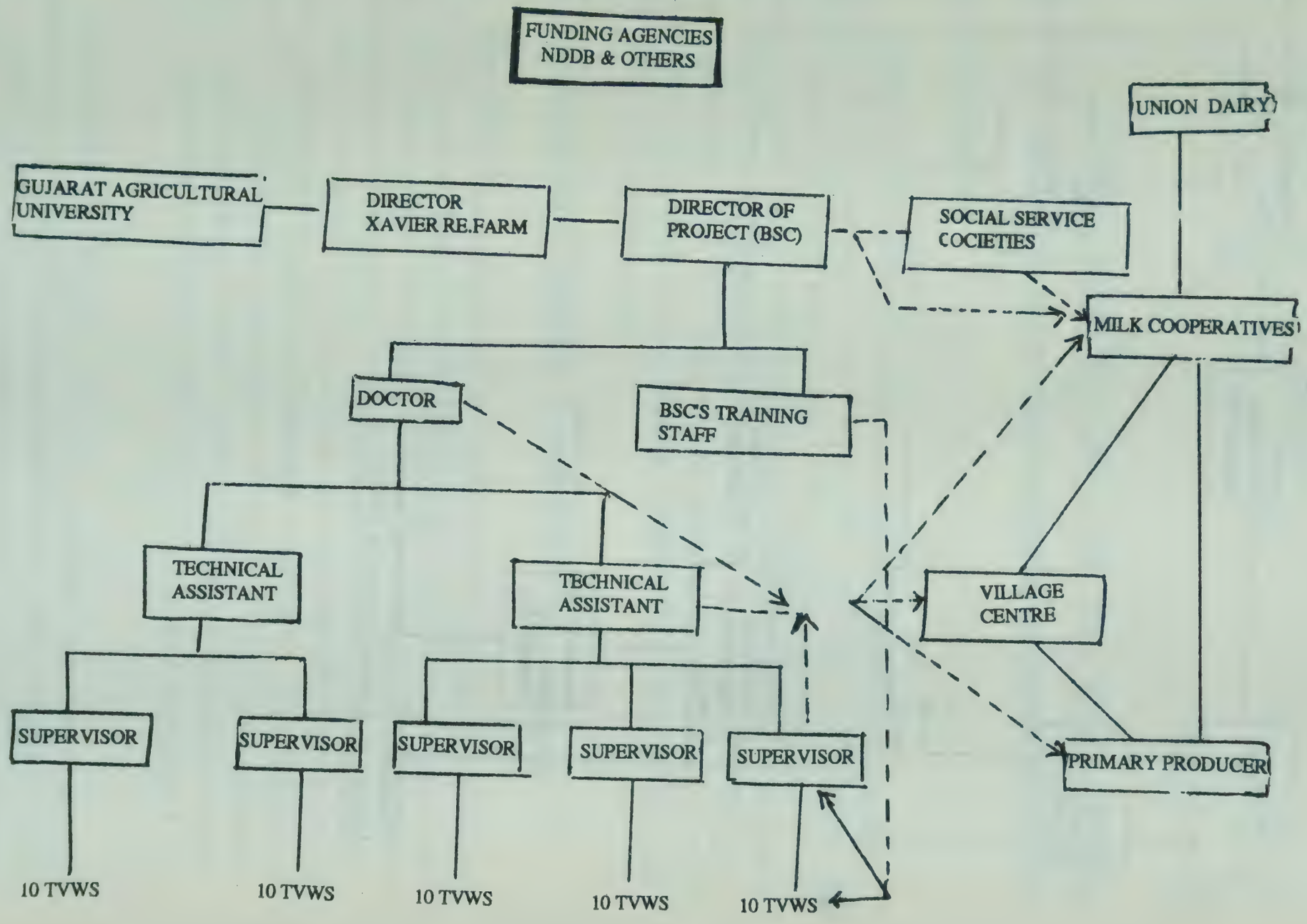
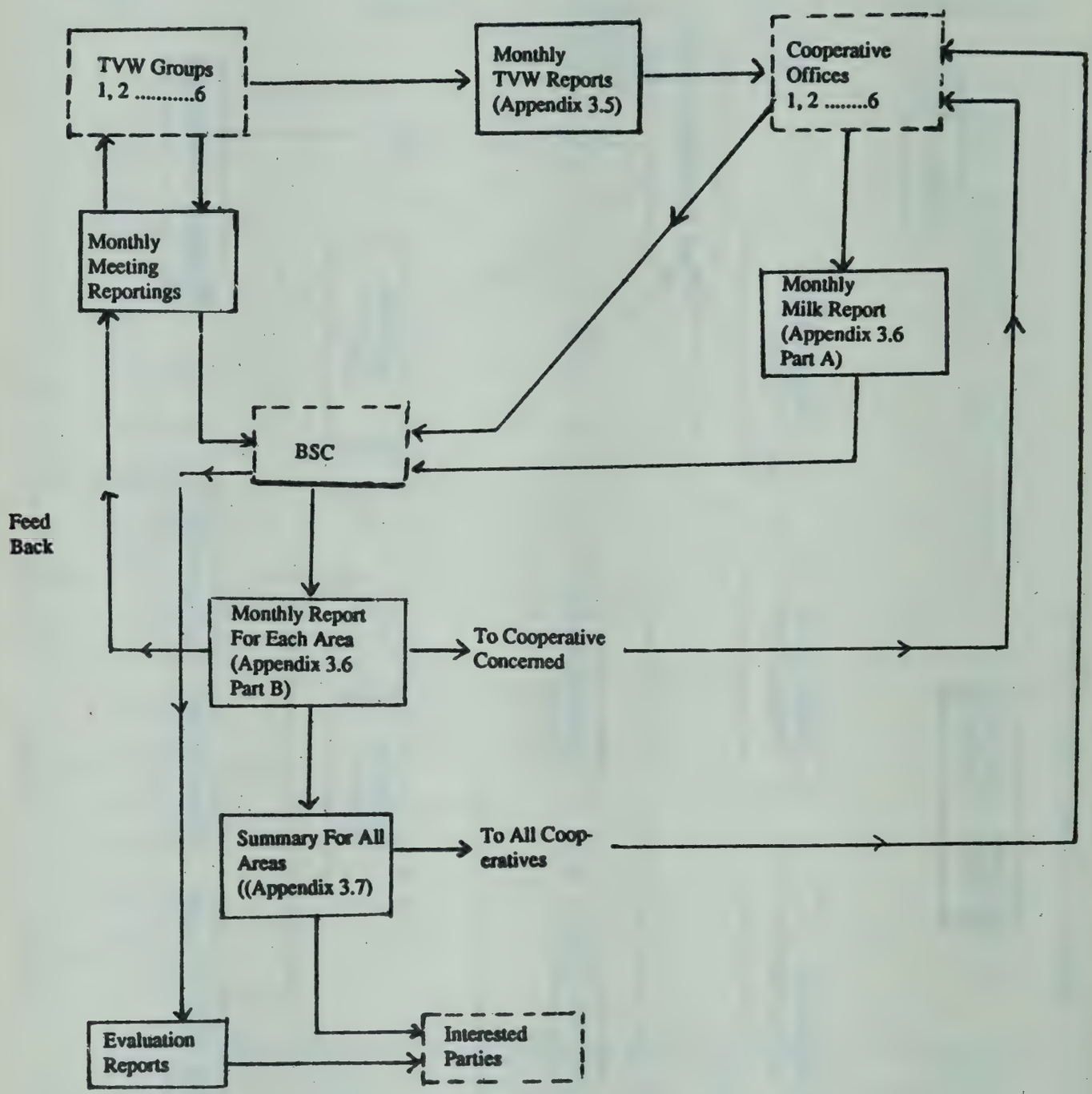


Figure 3.2
Flow of Information



Chapter 4

AHP and Economic Performance

4.1 Introduction

Using the LFM discussed earlier, this chapter examines and attempts to measure the contribution of the AHP to the economic performance of Dediapada and Zhankvav cooperatives. The conspicuous differences in their progress are attributed to differences in their administrative structure and to the varying socio-economic patterns prevalent in the villages of the respective cooperatives. On the basis of this analysis, suggestions are made regarding the administrative pattern most conducive to the economic viability of tribal dairy cooperatives.

4.2 Administrative Patterns in the Two Cooperatives

Each of the two cooperatives, Dediapada and Zhankhvav, has a distinctive administrative set-up. When the Dediapada cooperative started functioning in 1976, there was no Union Dairy in the entire district of Bharuch which could undertake the collection of milk from the villages or from the cooperative office. An agreement was worked out between the nearest outlet, SUMUL in Surat district, and the Dediapada cooperative. The cooperative assumed responsibility for collecting the milk from 43 appointed collection centres, and transporting it to the Chaswad chilling plant at its own cost; SUMUL undertook to collect the milk from Chaswad and to transport it to Surat.

Malpractices in Chaswad, however, compelled the cooperative to establish testing facilities in Dediapada itself (FPSM, 1982; Heredero, 1983). These constraints added to the burden of a cooperative office already highly centralised. Apart from the functions mentioned above, the cooperative office was responsible for a number of services such as payment to individual

members for milk supplied, purchase and distribution of cattlefeed, vaccines, medicines to the primary milk producer, and dealing with insurance companies, banks, and other institutions. These services were extended to all 43 villages spread out over an area of 20,680.43 hectares.[1]

Since these multiple services meant expenditure on infrastructural facilities, salaries and transportation costs, the Dediapada cooperative could not afford to pay the primary producer the full amount it received from the sale of milk to the Union Dairy. The effects of this on an already poor producer from the least developed taluka may well be imagined.

The administrative pattern of Zhankvav is comparatively decentralised. Since it serves six independent cooperatives responsible for individual villages, its functions are more evenly distributed. Moreover, the six cooperatives–Umarkhadi and Umarjhar in Mangrol, and Dadakui, Katkuva, Karutha and Isar in Mandavi–are located in villages which are relatively more developed than the villages belonging to the Dediapada cooperative. Of crucial importance is the fact that Zhankhvav does not, like Dediapada, incur any transportation costs. As it is based in Surat district, SUMUL directly collects the milk from the cooperative offices. Zhankhvav's decentralised nature and lower overhead costs ensure that its primary producer is better off than his counterpart in Dediapada. This fact is brought out by the share of operating expenses in total sales, as shown in Table 4.1.

Table 4.1: Percentage of Operating Expenses to Total Sales

	1982-83	1984-85
Dediapada	31.36	26.33
Zhankhvav *	5.47	8.73

*Data are available for only four cooperatives in 1982-83 and for three in the next two years.

As can be seen from Table 4.1, Dediapada's operating expenses have decreased, but they are still three times those of Zhankhvav's for the year 1984-85.

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1. Out of these 43 villages the Census of India 1981 lists only 38 villages (see Appendix 3.3). This means that 5 villages covered by Dediapada cooperative are not considered as independent villages and have been merged into other villages for the purpose of census classification. The total area covered by these villages refers to the 38 identified in the census.

4.3 The Growth of the Cooperatives

The growth of these cooperatives is evaluated with the help of three indicators: changes in membership, buffaloes per member, and monthly average of milk-supplying members.

The number of members served by the two cooperatives shows a steady increase during the years under study.

Table 4.2: Profile of Members and Buffaloes

	Total No. of Buffaloes	Total No. of Members	Buffaloes per Member	Monthly average No. of milk-supplying members
Dediapada				
June 1982	719	1330	0.5406	634*
May 1985	1672	1759	0.9505	822.9**
Change in 1982-85	953	429		
	(132.5)	(32)		
Zhankhvav				
June 1982	714	589	1.2122	360.49
May 1985	891	729	1.2222	446.17
Change in 1982-85	177	140		
	(25)	(24)		

Figures in brackets indicate the percentage of change over June 1982.

* This is the monthly average of the number of members supplying milk for the year 1982-83. On an average, about eleven non-members also supply milk every month.

** Monthly average for the year 1984-85.

Comparing the growth of Dediapada and Zhankhvav, one is struck by the artificiality of the former and the balance of the latter. In Dediapada the number of buffaloes increased by 132.5 per cent but membership by 32 per cent. Increase of stock was achieved by extensive buying of new buffaloes. In Zhankhvav, the animal stock rose by 25 per cent and membership by 24 per cent.

In June 1982, only half of Dediapada's members (665), on an average, owned a buffalo each. Between June 1982 and May 1985, the situation

changed: all the members of the cooperative managed to own at least one buffalo each, despite the fact that there was an increase of 429 members. However, the picture regarding the number of milk-supplying members is not so bright. In June 1982, the average number of milk-supplying members per month was 634, i.e. 47.67 per cent. This is understandable, considering the fact that only half the members owned buffaloes. During 1984-85, the average number of milk-supplying members was 823, i.e. 46.78 per cent of all members. The conclusion, therefore, is that more than half the members did not supply milk in spite of the fact that all of them by now owned a buffalo each. We may conclude that the number of dry animals was quite high.

The growth of the Zhankhvav cooperative follows a different pattern. Unlike Dediapada, almost each member owned a buffalo in June 1982, but no change took place during the three-year period. This may be due to the fact that there was no extensive buying of new buffaloes. The problem of members not supplying milk is far less acute than in Dediapada. On a monthly average, 61.2 per cent members supplied milk during 1982-83; it remained the same in 1984-85, the last year covered by this study. We may conclude that the productivity per buffalo in Zhankhvav has been steadier and higher than in Dediapada.

Over the three-year period 1982-85, the number of buffaloes owned by the cooperative members showed a definite increase in both Dediapada and Zhankhvav cooperatives. In the case of Dediapada, the population of buffaloes doubled, while membership rose by only one-third. In spite of the rise in the number of buffaloes, there was no corresponding increase in the number of milk-supplying members. As pointed out earlier, this can only be explained by a rise in the proportion of dry animals. In Zhankhvav, on the other hand, the rate of growth in the number of animals, of members and of milk-supplying members is approximately the same (25 per cent). This clearly shows that the growth of Zhankhvav cooperative has been much more uniform and based on a steady increase in productivity.

4.4 Analysis of Goal Indicators

The impact of OF on the economic condition of the rural population has been the subject of much controversy (Bowinder *et al.* 1987: A6). In general, the controversy has focused on the impact of OF on the nutritional standards of the poor. The present chapter limits itself to an analysis of the economic impact and does not take up the issue of nutritional standards.

As stated in Chapter 2, the goals are the apex of the pyramid of aims. To evaluate whether the goal had been realised three indicators were defined, namely, consumable income per cooperator, capital accumulation, and fixed assets per cooperator. These indicators measure the economic gains accruing to the cooperatives and ultimately to their members.

4.4.1. Consumable Monthly Income per Milk-Supplying Cooperator(G1)

In Dediapada the annual consumable income in 1982-83 was very low: Rs.1022.16. As can be seen from Table 4.3, this income registered a decline to Rs.842.52 in the year 1984-85: a fall of 17.57 per cent. The total income generated over the period improved only marginally, though the number of milk-supplying members increased by almost one-third.

Table 4.3:Total Income generated by the Cooperatives (Rupees)

	1982-83			1984-85		
	Annual Consu-mable Income	Total No. of Milk Supply-ing members	Total Income Gene-rated	Annual Consu-mable Income	Total No. of Milk-Supply-ing members	Total Income Gene-rated
Dediapada	1022.16	634.00	648049.44	842.52	822.9	693309.7
Zhankhvav	2178.00	360.49	785147.22	3018.84	446.17	1346915.8

In the case of Zhankhvav, the consumable income per milk-supplying member rose from Rs. 2,178 in 1982-83 to Rs.3,018.84 in 1984-85: an increase of 38.6 per cent over the three-year period. In addition, the total income generated rose sharply from about Rs.8 lakhs in 1982 to almost Rs.14 lakhs in 1985. While in 1982-83 the Zhankhvav cooperator earned twice as much as his counterpart in Dediapada, by the year 1984-85 he was earning more than three times as much as his Dediapada counterpart.

One reason for this difference in consumable income levels may be attributed to the lower price received per kg. of milk by the Dediapada cooperator. The prices received by the members of the two cooperatives are presented in Table 4.4.

Table 4.4: Prices fixed by the Cooperative

	Average Price Per Kg. of Milk		
	1982-83	1983-84	1984-85
Dediapada	2.05	2.13	2.31
Zhankhvav	3.44	3.50	3.93

Note: Prices fixed by the cooperatives depend partly on the price per kg. fat fixed by SUMUL and on the discount effected by each cooperative for administrative and other general expenses.

In 1984-85, the Dediapada cooperator received Rs.2.31 whereas the Zhankhvav cooperator was paid Rs.3.93. Over the three-year period, the Zhankhvav cooperator received a price almost double that received by his Dediapada counterpart.

In order to obtain a more realistic picture of the income growth in the Dediapada and Zhankhvav cooperatives, it is necessary to review the results obtained by related studies dealing with tribal cooperatives, keeping in mind the fact that the geographical regions covered by these studies are different. During the late 70s and early 80s the Economic Intelligence and Planning Department of the Bank of India (BOI-I), the Monitoring and Evaluation Department of the Bank of India (BOI-II), and the Dena Bank (DB) undertook separate evaluation studies among a selected sample of their beneficiaries (Anand and Savara 1985: 148).

Table 4.5 shows the various estimates of income obtained by the Bank studies, and the present study.

Table 4.5: Summary of Bank Studies and Present Study

Studies	Net income/Year (Rupees)				
	Years				
	1979-80	1981	1981-82	1982-83	1984-85
BOI-I	489				
BOI-II		1089			
DB			1327.00		
Present Study					
Dediapada			796.39	1022.16	842.57
Zhankhvav			1382.80	2178.00	3018.84

The comparability between the Bank studies and the present study is limited by two factors: (i) the definition of net income is different[2] and (ii) there is only one overlapping year (1981-82) for both studies. Despite these differences one fact is clear: Dediapada has a lower income level compared with the beneficiaries covered by the Bank studies. This fact is brought out by the comparison of income levels for the overlapping year 1981-82. Zhankhvav, on the other hand, is on par with the Bank studies for the overlapping year 1981-82. The net income for this year was Rs.1383 in Zhankhvav compared with the figure of Rs.1327 obtained by the DB. Considering that the figure estimated by the DB was deemed to be "highly optimistic", that it includes the amount to be repaid as bank-loan, and that such amount has already been deducted from the income figures estimated in this study for Dediapada and Zhankhvav, we may conclude that the economic benefits obtained by a cooperator from Zhankhvav are clearly higher than those obtained by the tribal cooperators analysed by the Bank studies.

Table 4.6: Consumable Income Per Milk-Supplying Member

(Rs.per day)

	1982-83	1984-85
Dediapada	2.84	2.34
Zhankhvav	6.02	8.39

A feasibility study conducted by the Bank of Baroda in 1983 provides the basis for further comparison (Anand and Savara 1985: 149). According to the scheme proposed, the milk cooperative endeavour is economically feasible only if it provides at least Rs.617.00 as annual net income, or Rs.1.69 per day per buffalo.

As shown in Table 4.6, the milk-supplying cooperator of Dediapada and Zhankhvav earned more than this.

A final assessment of the economic performance of these cooperatives must bear in mind that in 1984-85, dairy farming had generated Rs. 13.5 lakhs and 7.9 lakhs of net income in Zhankhvav and Dediapada cooperatives respectively. This is no mean achievement, especially in the context of a tribal society which finds it increasingly difficult to raise revenues from

2. These studies, in calculating income per year, include imputed labour costs and repayment of loan to the bank.

resources within its traditional habitat. The question could still be asked: how 'important' is the annual consumable income received from dairy farming? This 'importance' has to be evaluated with respect to some other form of income. In 1985-86, the per capita income of Gujarat at current prices was Rs.2,772 (Tata 1988-89: 22). One year earlier, an 'average' milk-supplying member from Zhankhvav had received more than one and a half times this amount as income accruing *only* from milk, while his counterpart in Dediapada had obtained one-third of this amount from the same source.

4.4.2 Capital Accumulation per Cooperator (G2) and Fixed Assets per Cooperator (G3)

Capital accumulation and fixed assets per cooperator are the other two goal indicators used to analyse the economic impact of dairy cooperatives. They measure the long-run economic performance of the cooperative as an enterprise.

Dediapada cooperative has fared better in terms of capital accumulation and fixed assets than it has with regard to consumable income. It has also recorded a performance that is even better than Zhankhvav's. Though the rate of growth of capital accumulation per cooperator during 1982-85 in both Dediapada and Zhankhvav has remained almost the same (13.8%), in 1984-85 the capital accumulation of a cooperator in Dediapada was almost twice that of a cooperator in Zhankhvav (Table 4.7). Since total 'accumulated capital' includes the value of share capital, of reserve funds and of accumulated profits, we can surmise that the difference in the values of G2 between Dediapada and Zhankhvav is due to a greater retention of reserve funds by the former, since accumulation of profits is not permitted under the cooperative bye-laws and no significant difference in the value of share capital between the two cooperatives is likely to occur.

While the fixed assets of the Zhankhvav cooperator increased during 1982-85 by 35.51 per cent, the Dediapada cooperator enjoyed a growth rate of 69.98 per cent. His fixed assets in 1982-83 (Rs.252.20) were about six times those of a Zhankhvav cooperator (Rs. 42.41). In 1984-85, the fixed assets per co-operator in Dediapada were seven times those of Zhankhvav. One reason for this increase in the fixed assets of Dediapada could be the initial large expenditure on fixed assets: it included the purchase of a truck, buildings and large infrastructural facilities which were needed to collect, check and test the milk. The creation of assets seems also to have been

achieved by retaining a relatively large share of the producers' income: the income retained by Dediapada is four times that retained by Zhankhvav in 1982-83; in 1984-85 it is more than five times that of Zhankhvav (Table 4.8).

Table 4.7: Capital Accumulation and Fixed Assets

	Capital Accumulation per co-operator (Rs.) (G2)			Fixed Assets per co-operator (Rs.) (G3)		
	1982-83	1984-85	Rate* of change	1982-83	1984-85	Rate* of change
Dediapada	509.82	580.13	+13.8	252.20	427.93	+69.68
Zhankhvav**	312.45	329.82	+13.79	42.41	57.47	+35.51

* Rate of change measures the percentage increase (+) or decrease (-) over the period 1982 -83 to 1984-85.

** Data available only for four co-operatives.

Table 4.8: Income Retained By Co-operatives (Rs./month/member)

	Year	Income retained by co-operative
Dediapada	1982-83	16.5
	1983-84	17.05
	1984-85	22.41
Zhankhvav	1982-83	4.61
	1983-84	5.62
	1984-85	4.88

These figures demonstrate that from an economic point of view, the centralised model of Dediapada is costlier to the producer and, therefore, less desirable than the decentralised one of Zhankhvav.

4.4.3. Conclusions

The present study has undertaken an analysis of the goal indicators in order to evaluate the goal of the AHP, namely, to improve the economic situation of the cooperatives. From the analysis of the goal indicators, certain conclusions may be drawn:

(i) The introduction of dairy farming has generated a large flow of net income into very poor tribal communities. This additional income in cash will favour a further monetisation of a subsistence economy and lead to greater commercialisation. We may also note that this additional income has flowed from a productive activity and not from a mere employment-providing scheme.

(ii) The economic progress of Dediapada and Zhankhvav cooperatives has been very different. In Dediapada, the introduction of dairy farming seems not to have created much confidence among the tribals in the profitability of this activity. This is not surprising in view of the fact that consumable income has fallen over the three-year period covered by this study. In other words, the economic viability of the cooperative remains still an open question. In Zhankhvav, consumable income has shown an increase of approximately 50 per cent for the same period and hence the economic viability of this cooperative has been strengthened. Reference to other studies dealing with income obtained from milk supports this conclusion. One is tempted to conclude that dairy farming and the AHP have been successful in the more developed talukas of Mangrol and Mandvi. This conclusion, however, must be partially modified in the light of the special conditions facing Dediapada.

(iii) Prices paid by the Dediapada cooperative to its members are consistently lower than those paid by Zhankhvav. This has depressed the level of net income received by its members. The retention share has been used to increase the infrastructural facilities and this explains the unusually high levels of fixed assets per cooperator. The over-centralised model adopted by Dediapada to minimise the cost of transporting the milk to SUMUL has ultimately left the producer with a falling consumable income. To that extent, it has failed to achieve a better economic position for its members.

4.5 Analysis of Objective Indicators

In the LFM's hierarchy of aims achievement of the objective contributes towards the attainment of the goal. Since, in our case, the goal of improved economic performance depends entirely on the revenue accruing to the cooperative from the sale of milk (Section 2.3.2), the objective of raising milk output and productivity becomes a cardinally important factor. This section analyses the output and productivity trends observed in Dediapada and Zhankhvav cooperatives.

4.5.1 Trends in Output and Productivity

Table 4.9 summarises the main trends in yield and productivity. For the sake of clarity, the analysis distinguishes productivity per animal from productivity per member. We examine the cases of Zhankhvav and Dediapada separately.

The case of Zhankhvav exemplifies the *positive* side of the story, and this success must be attributed largely to the AHP. Zhankhvav records a higher (30 per cent) rate of growth in output than Dediapada (14 per cent), an increase in output directly related to a rise in the productivity per animal: the yields per in-milk and per milch animal have risen by 20 per cent. The rates of growth in productivity per member are, however, half the rates of growth in productivity per animal: the yield per milk supplying member rose by only 5 per cent and the yield per cooperator increased by 10 per cent. These lower rates of growth in real (milk) productivity per member are reflected in the lower rates of growth in value-productivity: milk sales per cooperator to SUMUL and milk receipts ('purchased') per member from the cooperative rose by 11 per cent. This moderate increase explains the net income gains that have accrued to the milk-supplying members of Zhankhvav—about 60 per cent of total members in 1984-85. One may conclude, therefore, that the AHP has played an important role in raising productivity per animal but this has not been matched by a corresponding increase in productivity per member.

Dediapada presents the *negative* side: the values of all productivity indicators are much lower than the values of the same indicators for Zhankhvav. The small increase (14 per cent) in milk output has been the result of more than doubling (132.5 per cent) the size of the stock in three years through a massive importation of new animals. This conclusion is based on the different rates of growth exhibited by the yield per in-milk and the yield per milch animal: the former rose by 5.6 per cent and the latter by 45 per cent. This difference can only be explained by the addition to the stock of newly bought wet buffaloes that either remain productive for a very short while, or whose daily productivity is negligible. The case of Dediapada is a classic example of the attitude of OF and SUMUL to the tribal producers: government subsidies and loans are used to increase output for a short period and thereby satisfy the increasing urban demand for milk, but no attention is paid to improving productivity—the latter alone can enable tribal cooperatives to become self-sufficient and economically viable.

In short, milk output has increased in Dediapada for the benefit of SUMUL; productivity per animal has remained stagnant and productivity per member has worsened, notwithstanding the efforts made by the NGDO and the intervention of the BSC. The fall in productivity per member is the reason for the decline in net income accruing to the milk-supplying member of Dediapada.

Table 4.9 Milk Outpur and Productivity

Indicators	Code Number	Cooperatives					
		Dediapada			Zhankhav		
		1982-83	1984-85	Rate of Change %	1982-83	1984-85	Rate of Change %
Milk Output (litres)	0B1	4,66,386.8	5,31,256.8	14.0	2,96,996.0	3,86,305.2	30
Average yield per animal in milk (ltrs/yr).	0B2	551.76	582.48	5.6	840	1007.3	20
Average yield per milch animal (ltrs/yr.)	OB3	174	252.72	45.2	391.08	471.72	21
Average milk output per milk-supplying member (ltrs./yr.)	OB5	722.52	632.88	-12.4	822.6	862.32	5
Average milk output per cooperator (ltrs/yr.)	OB4	321.36	321.12	-0.07	497.16	546.36	10
Milk sales per coperator (Rs./month)	OB6	69.65	80.22	15.17	143.6	156.13	11.1
Milk purchased per cooperator (Rs./month)	OB7	54.15	57.91	6.75	138.66	151.25	11.6

Table 4.10: Comparative Yields per Milch Animal

		Year	Milk yield per milch animal (kg/day)
1.	National average*	1961	1.38
		1982	1.74
2.	Non-descript Indian Buffalo**	1978	1.10
3.	Zhankhvav	1984-85	1.29 (ltrs)
4.	Dediapada	1984-85	0.69 (ltrs)

* Nair, 1985, A-90.

** Estimate obtained by NDRI in 1978 (Acharya-Huria, 1986: 1654).

Table 4.11: Comparative Yields per Animal in Milk

State	Year	Milk yield per animal in milk (kg/day)
Eastern U.P.	1962-63	1.31
Karnataka	1965-66	1.32
Andhra Pradesh	1966-67	1.40
Dediapada*	1982-83	1.51 (ltrs)
	1984-85	1.60 (ltrs)
Madhya Pradesh	1966-67	1.77
Tamil Nadu	1965-66	1.96
Kerala	1964-65	2.01
Rajasthan	1962-63	2.02
Maharashtra	1965-66	2.26
Zhankhvav *	1982-83	2.30 (ltrs)
	1984-85	2.80 (ltrs)
Gujarat	1963-64	3.08
Bihar	1965-66	3.14
Punjab	1966-67	3.99

Source: Daroga Singh, et al. "Monograph on estimation of milk Production", Institute of Agricultural Research Statistics, ICAR, New Delhi (undated). Quoted by Nair 1979: A-37.

* Based on the present study.

Tables 4.10 and 4.11 provide us with a yardstick to evaluate the *levels* of productivity achieved by Zhankhvav and Dediapada cooperatives. The position of the latter appears to be quite dismal. The milk yield per milch animal is two and a half times lower than the national average for the year 1982, and it is less than half the national average in 1961. In 1984-85 the yield per in-milk animal obtained in Dediapada is half the average yield in Gujarat state 20 years earlier; only the estimates obtained in three states during the mid-sixties show lower yields. This comparison clearly brings out the difference between the productivity levels in India and those achieved by a tribal cooperative.

The relatively higher productivity levels obtained by the Zhankhvav co-operatives *vis-a-vis* Dediapada come into a more realistic perspective when they are compared with other figures. In 1984-85, the yield per milch animal in Zhankhvav was lower than the national average in 1961. The yield per in-milk animal in 1984-85 was much lower than the average for Gujarat 20 years earlier. We can therefore conclude that even in the Zhankhvav cooperatives where productivity has increased, the levels achieved are well below national standards.

Comparative figures for milk sales per cooperator are provided by a study (Bank of India 1981: 44) based on a random selection of 150 beneficiaries from 12 milk societies spread over Surat and Valsad districts. In 1980-81, the average milk sales per cooperator was found by the BOI study to be Rs.1753/year, while in 1984-85 milk sales per cooperator was Rs.962.6 and Rs.1873.6 in Dediapada and Zhankhvav respectively (See Table 4.9). Assuming that an increase may have taken place in milk-sales during the period 1980-81 to 1984-85 among the beneficiaries selected in the Bank of India study, we may conclude that the productivity per cooperator in Dediapada is about half the productivity recorded in the BOI study, and the productivity per cooperator in Zhankhvav may be around the productivity levels achieved by the beneficiaries selected in the BOI study.

4.5.2 Monthly Milk Yield per Intercalving Period (OB8)

Productivity per animal can also be measured on the basis of the monthly milk yield per buffalo during various intercalving periods. Data regarding this indicator is presented in Table 4.12.[3]

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3. For a proper understanding of Table 4.12 note:

(i) These estimates have been calculated from the figures given in Appendix 4.1 as follows: The average yields per animal obtained during the first intercalving for the years 1982-

Table 4.12: Average Milk Yield per Intercalving Period

(Ltrs./Month)

Cooperatives	Intercalving periods			
	First	Second	Third	Fourth
Dediapada	25.11	29.12	43.23	38.20
Zhankhvav	33.7	52.7	68.1	72.45

In both cooperatives the milk yield shows a tendency to increase in successive intercalving periods. This unusual phenomenon may be attributed to the services provided by the AHP. As we move from one intercalving period to another, the differences in milk yield between Dediapada and Zhankhvav progressively widen. These figures provide us with another insight into the higher yields per animal obtained in Zhankhvav. After the first intercalving period, the yield per animal in Zhankhvav is double the yield per animal in Dediapada.

4.5.3 Conclusion

The results obtained from the analysis of productivity indicators allow us to establish the causal links between goals and objectives. The rise of consumable income in Zhankhvav and the fall experienced by the same indicator in Dediapada can be explained as follows.

In Zhankhvav, the increase of 38.6 per cent in the consumable income per milk-supplying member has been accompanied by a rise of 30 per cent in milk output, of 20 per cent in productivity per in-milk and milch animal, and of 11 per cent in productivity per member (sales per cooperator). The difference between the rise in income per milk-supplying member and the rise in productivity per member is due to the fact that, in an average month, 39 per cent of members do not supply milk. One may infer, therefore, that the rise in income has been partly the effect of an increase in milk output and productivity. The term 'partly' is used in recognition of the fact that the rise in

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83, 1983-84, and 1984-85 have been averaged, and this figure has been divided by the mean length of the first intercalving period during 1983-85.

(ii) Data regarding the inter-calving period has been collected *only* for the animals born in the cooperatives. Frequent malpractices by merchants make it very difficult to ascertain whether the animals are bought after or before the first calving.

income has also been influenced by the rise in the price of milk paid by SUMUL to the cooperatives over the three years and consequently by the relatively higher prices received by the members.

In Dediapada, the fall of 17 per cent in consumable income has been accompanied by a rise of 14 per cent in milk output, of 5.6 per cent in productivity per in-milk animal and a rise of 15 per cent in productivity per member (sales per cooperator). At the outset, we may note the discrepancy existing between the fall in consumable income per milk-supplying member and the rise in productivity per member; the discrepancy is more puzzling if we consider that in an average month, about 50 per cent of members do not supply milk. This issue can be clarified if we consider the following table (Table 4.13) and take additional information into account.

Table 4.13: Revenue and Consumption

Year	Revenue received from SUMUL per member (Sales per member) (Rs./Year)	Revenue received from cooperative per member (Purchases per member) (Rs./Year)	Consumable income per milk-supplying member (Rs./Year)
1982-83	836	650	1022
1983-84	966	761	1112
1984-85	963	694	843

The fall in consumable income per milk-supplying member takes place during 1984-85 and it is due to:

(i) a slight fall in the revenue per member received from SUMUL related to the marginal drop in the average milk yield per member (Table 4.9).

(ii) an increase in the yearly amount per member retained by the cooperative which rises from Rs.186 per member in 1982-83 to Rs.269 per member in 1983-84 (Table 4.8).

(iii) a rise in the number of milk-supplying members (Table 4.3), although the proportion of these to the total membership has decreased.

It is because of (iii) that the discrepancy between consumable income and productivity per member (sales per member) arises. We may conclude that the policy of doubling the stock of buffaloes by massive importation of new animals has resulted in raising output marginally, leaving productivity per in-milk animal and milk output per member stagnant. If we add to this the cooperative's need to raise the amount retained per member for covering overheads, then we can understand the reasons for the deterioration in the economic position of the members.

In the following section we analyse purpose indicators so as to establish the link between output/productivity and the AHP.

4.6 Analysis of Purpose Indicators

Purposes are those aims that have to be achieved in order to fulfil the objectives. The purpose indicators employed in this section are of two types: those which increase output and productivity in the long run, and those which do so in the short run. The long run indicators are the replacement rate (P1), the current season's calving (P2, P3); and the male calves rate (P4); and the short run indicator is the in-milk rate (P5).

4.6.1 Replacement Rate (P1) and Current Season's Calving (P2, P3)

The first of these (P1) measures the ratio of all the female calf-stock to the year's total opening stock. The latter (P2, P3) indicate the ratio of the total number of calves, male and female, born during the year to the yearly opening and closing buffalo stock.

Table 4.14 throws light on some changes that have taken place in the composition of the animal stock. We begin with an analysis of P1. In 1984-85, the value of P1 for Dediapada and Zhankhvav was 0.35 and 0.55 respectively. These values imply that the percentage of female calves was about one-third (35%) the total opening stock as of June 1984 in Dediapada, and more than half (55%) of the total opening stock in Zhankhvav.

We may also add that the rate of growth of P1 in Dediapada is quite different from the rate of growth of P1 in Zhankhvav; in the former it is almost nil while in the latter it is 45 per cent. Since in Zhankhvav the buying of adult females has been very limited, the spurt in the rate of growth of P1 can only be explained by the increase in the number of new born female calves within

the herd. This phenomenon is clearly visible for all three years covered by our study. From this we may infer that the female stock in Zhankhvav is becoming relatively younger than in Dediapada; this in turn means that the future productive and reproductive capacity of the herd will be greater in Zhankhvav than in Dediapada. The reasons for the relatively older composition of the female stock in Dediapada could be twofold: (i) male calves have been born in greater number than female calves, and (ii) there exists a higher death rate among the female calves. We postpone the discussion of these two issues until we analyse the behaviour of P2.

Table 4.14: Changes in the Composition of the Buffalo-Stock

Year	P1(D)	P1(Z)	P2(D) Opening stock	P3(D) Closing stock	P2(Z) Opening stock	P3(D) Closing stock	P4(D)	P4(Z)
1982-83	0.35	0.38	0.24	0.24	0.23	0.22	0.57	0.54
1983-84	0.25	0.49	0.52	0.34	0.36	0.35	0.58	0.56
1984-85	0.35	0.55	0.49	0.31	0.38	0.33	0.55	0.52
Rate of Change (%)	0.45	44.50	101.55	30.00	67.37	50.00		

D = Dediapada
Z = Zhankhvav
P4 = New male calves/ Total new calves

P1 = Replacement rate
P2,P3 = Current season's calving

Indicator P2 describes the ratio of new born calves (male and female) to the total opening stock. In 1984-85, the values of P2 for Dediapada and Zhankhvav were 0.49 and 0.38 respectively. This means that in Dediapada almost half (49 per cent) of the stock calved compared with 38 per cent of the stock in Zhankhvav. In other words, the proportion of calvings among the female stock was greater in Dediapada than in Zhankhvav. Over the three-year period, the proportion of calving animals to the total stock has doubled (102%) in Dediapada, while it increased by 67% in Zhankhvav. This result however needs to be viewed with some caution.

At this point, the implications of using the term 'opening stock' in the definition of P1 and P2 need to be clarified. When P1 and P2 are computed over the year's 'opening stock', buffaloes bought during the year are not

included in the denominator of both ratios, but the calves born from them in that year are included in the numerator of P1 and P2. In other words, the buying of new (pregnant) buffaloes through the year increases especially[4] the value of P2 because the new calves born from the imported buffaloes raise the value of the numerator, while the value of the denominator (opening stock) remains the same. If we define P2 (and P1) in terms of the 'closing stock', however, the addition of newly bought buffaloes is counted in the denominator and this evens out the addition of new calves, giving us comparable figures for the two cooperatives.

The above distinction is crucial if we are to understand the results of the different policies followed by Zhankhvav and Dediapada in the management of the herd. Considering only the values of P2 and P3 for 1983-84 and 1984-85, we may sum up the facts as follows:

(i) The values of P2 for Dediapada are greater than the values of P2 for Zhankhvav and the difference is large.

(ii) The values of P3 for Dediapada are marginally lower than the values of P3 for Zhankhvav.

(iii) This reversal is due to the fact that in Dediapada the values of P2 are greater than those of P3, while in Zhankhvav they are almost the same.

What (iii) really tells us is that over the last two years of the study the cooperative of Dediapada imported a large number of buffaloes which calved during the year. This raised artificially the value of P2 and projected a false picture of the replacement rate of the herd.[5]

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4. This is because for P1 only newly born *female* calves are added to the total stock of female calves in the numerator, while in P2 both female and male calves are counted in the numerator.

5. Another important feature that needs explaining is that P2 (based on the opening stock) in Dediapada is greater than P1, while in Zhankhvav the reverse is true. In Dediapada, therefore, the proportion of new born calves to the opening stock is greater than the proportion of all female calves to the total opening stock. Three possible explanations are possible: (i) the number of male calves is greater than the number of female calves born; (ii) the mortality rate among the latter is high; and (iii) the estimation of P2 on the basis of the opening stock allows the number of imported buffaloes to raise unduly the value of P2.

The first explanation is not plausible because ratio of new born males to total calves (P4) is almost the same for both cooperatives (Table 4.15). As we shall see in section 4.7.1, the female calf mortality rate has been higher in Dediapada than in Zhankhvav; hence, the second explanation holds. The third explanation is probably the most important because when P2 is computed on the basis of the closing stock (P3), its values become smaller than the values of P1 for 1982-83 and 1984-85.

Our analysis of purpose indicators shows that the productive and reproductive capacity of the stock in Zhankhvav has been placed on a much sounder footing than in Dediapada. We have observed once more that the policy adopted in Dediapada of large-scale buying has obscured the fact that the reproductive capacity of the herd has not markedly improved. We may finally note that the effects of the AHP are visible in the increase of P3 both in Zhankhvav and in Dediapada. In the former the current season's calving increased by 50 per cent, while in the latter it increased by 30 per cent. This rise in the calving rate is, in all likelihood, due to the better post-natal care provided by the AHP.

4.6.2 The In-Milk Rate (P5)

The in-milk rate (P5) determines the short run changes in milk output and productivity. Various studies (Nair 1985: A-85 to A-95; George 1986: 2147-50) have dealt with the factors responsible for change in total milk output. Nair distinguishes two factors: (i) quantitative change in the population of milch animals, and (ii) change in the annual average milk-yield per milch animal. George adds a new factor when he decomposes the change in the annual average milk yield per milch animal into (a) change in the percentage of animals in milk, and (b) change in the annual average milk-yield per animal in-milk. Applying an improved decomposition formula,[6] J. George estimates that these three factors--the 'pure effects' as he calls them account for 93 per cent of the total increase in India's milk output during 1971-82. More specifically, for the same period, he has found out that the contribution to increased milk output (i) of milch population, (ii) of 'breeding efficiency'--a term borrowed from Misra (Misra, 1978; 1979-81) to define the proportion of in-milk animals--and (iii) of the in-milk animal's average productivity is 60 per cent, 18 per cent, and 17.6 per cent respectively for the buffalo.

These studies demonstrate the importance of the in-milk rate, i.e., the breeding efficiency, in increasing milk output. Nevertheless, George seems to exaggerate the role of cross-breeding in improving breeding efficiency. Besides cross-breeding, improvements in the in-milk rate can also be affected through a comprehensive animal health programme. ' Prompt detection of heat symptoms, and successful inseminations are some examples of the way in which the AHP can improve breeding behaviour and practices, thereby increasing the in-milk rate. Thus there exists an important link

6. The formula has been developed in connection with studies on the factors responsible for change in agricultural output (Minhas, Vaidyanathan, 1965; Dharm Narain, 1977).

between the increase in milk output and yield (productivity) on the one hand, and improved health practices brought about through the AHP, on the other.

In the present study, the in-milk rate (P5) is defined as the ratio of the total number of in-milk animals to the total number of buffaloes. Table 4.15 shows the in-milk rate in the two cooperatives, Dediapada and Zhankhvav.

Table 4.15: In-Milk Rate

	1982-83	1984-85	1984-85	Rate of change in Percentage
Dediapada	0.2930	0.3949	0.3955	34.98
Zhankhvav	0.4168	0.4429	0.4705	12.88

There has been a moderate rise in breeding efficiency over the three years: 35 per cent and 12 per cent in Dediapada and Zhankhvav respectively. The relatively large increase of the in-milk rate in Dediapada took place in 1983-84, and is likely to be the result of the new buffaloes bought by the cooperative. This is due to the fact that the in-milk rate is the ratio of wet animals to the total opening stock, and hence, the new buffaloes bought are not counted in the denominator of the ratio. In Zhankhvav, the proportion of buffaloes in milk has been consistently higher than the proportion of in-milk animals in Dediapada. For an evaluation of these rates we need to compare them with the levels achieved in the period prior to this study and with the breeding efficiency reported by other studies.

The Behavioural Science Centre conducted in 1980-81 a study (Heredero 1983: 297) based on a random sample of villages belonging to Dediapada and Zhankhvav cooperatives. The results of this study reveal that the in-milk rate was 0.40 and 0.65 respectively. Five years later the in-milk rate in both cooperatives had declined considerably. Based on Nair's data (Nair 1985: A-93) we have calculated the national average in-milk rate in 1977 as 0.53. We may conclude that even in the case of Zhankhvav, the proportion of animals in milk is lower than the national rate almost 10 years earlier.

Though the in-milk rate in Dediapada and Zhankhvav has been slowly rising, the increase has not been good enough to raise it either to the level attained earlier or to the national level. On this count, the effectiveness of the AHP can be questioned.

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To obtain a more balanced picture of the effects of the AHP on the in-milk rate we have to analyse the pattern of the in-milk rate curves in both cooperatives. The improvement that has taken place in the in-milk rates can be better understood with the help of figures 4.1 and 4.2. The rise in the rates show two different types of effects:

(i) In both cooperatives the peaks of the in-milk rate curves are higher for successive years; in other words, over the three years, the proportion of animals in milk during the 'flush' season (November in Zhankhvav and October-December in Dediapada) has been increasing.

(ii) The in-milk rate curves for both cooperatives, especially for Zhankhvav, have shifted entirely upwards: for example, the 1984-85 curve lies wholly above the 1982-83 curve for nearly all the twelve months. This means that the rise in the proportion of in-milk buffaloes has taken place not only during the 'flush' season, but has been maintained over most of the slack season. The increase in milk output must be attributed to this ability to raise the percentage of in-milk animals for almost the whole year, and not merely to the importation of new buffaloes into the cooperative. This sustained rise in the in-milk rates is primarily due to the services provided by the AHP.

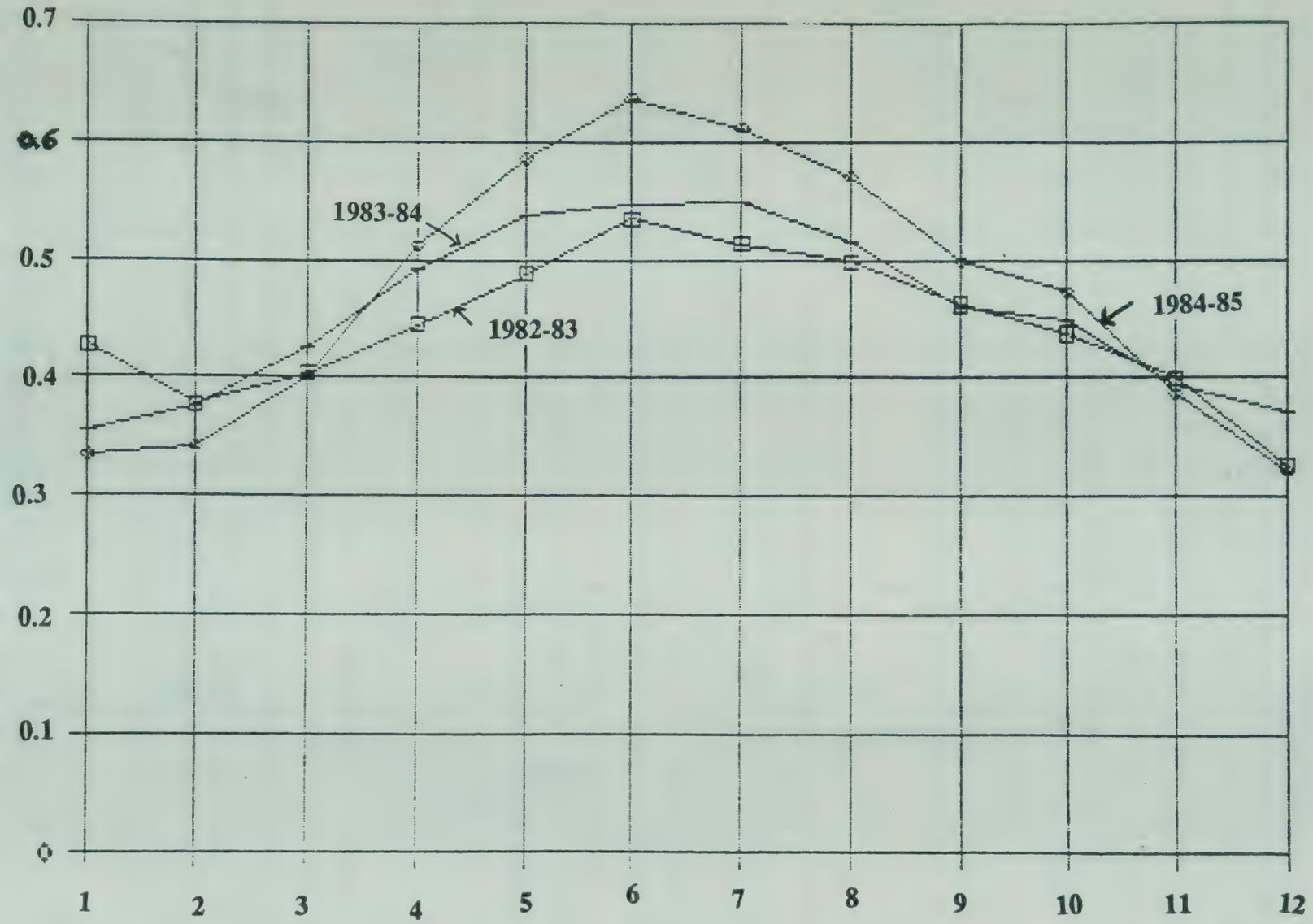
4.6.3 Conclusion

To determine the causal linkages between objectives (milk output and productivity) and purposes (herd build-up and breeding efficiency), we adopt the analytical framework and the results put forward by J. George. According to this study, the increase in milk output depends mainly on three factors: increase of the milch population, the breeding efficiency, and the yield per in-milk animal. It has been further shown that of the total increase in milk output, 60% may be explained by a rise in the milch population, 18% by a rise in breeding efficiency (in-milk rate), and 17% by an increase in the yield per in-milk animal.

It remains to evaluate how far the AHP has affected each of these three factors if we are to understand its ultimate impact on milk output.

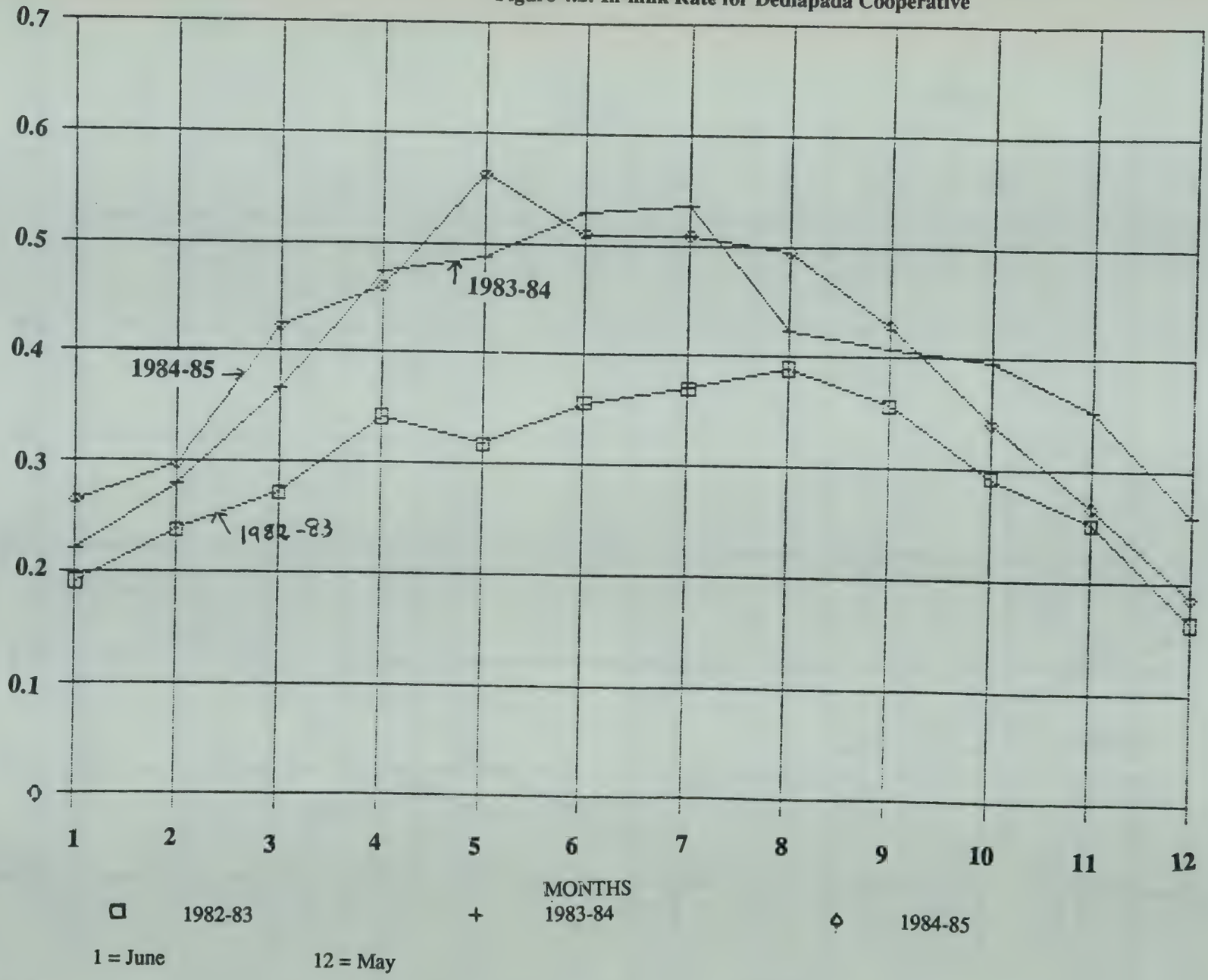
In the long run, raising P1, P2, and P3 will increase the milch population and ultimately milk output. In Zhankhvav, there has been a steady increase in the proportion of female calves to the total stock; it rose from 38 per cent in 1982-83 to 55 per cent in 1984-85, that is, an increase of 45 per cent. As

Figure 4.1: In-milk Rate for Zhankhvav Cooperative



1 = June 12 = May

Figure 4.2: In-milk Rate for Dediapada Cooperative



the composition of the female stock becomes younger the future rate of growth of the stock will be higher. In other words, the milch population will grow at a faster rate and there is a greater likelihood of a faster growth in milk output. The situation in Dediapada is very different. The proportion of female calves to total stock has remained unchanged at 35 per cent and to this extent there is little hope that the rate of growth of the milch population will rise. When the calving rate (P3) is calculated on the basis of the closing stock, the behaviour of this indicator in both cooperatives is very similar: in Dediapada the proportion of total animals which calved rose from 24 per cent in 1982-83 to 31 per cent in 1984-85, that is, an increase of 29 per cent; in Zhankhvav, it rose from 22 per cent to 33 per cent, an increase of 33 per cent. In other words, about one-third of the adult female stock calve during a year. Since the number of adult females is likely to grow faster in Zhankhvav than in Dediapada, the milch population will grow faster in the former than in the latter.

In the short run, changes in the breeding efficiency (in-milk rate) affect the volume of milk produced. In Zhankhvav, there is a correspondence between the rise in output (30%) and the rise in the breeding efficiency (12%). We may also note that (i) the in-milk rate has been increasing steadily over the three year period, (ii) higher values for the in-milk rate have been obtained not only during the flush season but over a period of at least six to seven months, and (iii) the breeding efficiency of Zhankhvav (0.47) is higher than the in-milk rate of Dediapada (0.40). In Dediapada the breeding efficiency has grown faster than output: the latter rose by only 14 per cent while the former rose by 35 per cent. It is also important to note that almost all this growth in the breeding efficiency occurred during 1983-84; this was probably the outcome of new animals brought into the cooperative during that year. Since changes in the breeding efficiency are not major determinants of output, the rise in the in-milk rate was not proportionately 'translated' into corresponding changes in output. It is also important to remember that during the same period the increase in the yield per animal in milk was negligible and this may have dampened the overall effect of the rise in the breeding efficiency on output.

4.7 Analysis of Target Indicators

Targets are the set of aims which have to be achieved in order to fulfil the purposes: the herd build-up in the long run, and increased in-milk rate in the short-run. Target indicators have been divided into four broad groups:

herd mortality, breeding behaviour, breeding practices, and nutritional standard of the herd.

4.7.1 Herd Mortality

Two indicators measure the mortality of the stock: mortality rate (T1), (Table 4.16) and female calf mortality rate (T2) (Table 4.17). The vaccination rate (T3) (Table 4.18) is included in this group because it plays an important role in reducing mortality. The mortality rate (T1) measures the number of dead buffaloes as a proportion of the total buffalo stock. T1 therefore influences the herd build-up in the long-run.

Table 4.16: Mortality Rate (T1)

	1982-83	1983-84	1984-85	Rate of change in percentage
Dediapada	0.0610	0.1050	0.0831	36.23
Zhankhvav	0.0262	0.0261	0.0408	55.73

There has been an increasing rather than a decreasing trend in mortality rates. During the three years covered by the study, the mortality rate in Dediapada was higher than that in Zhankhvav. Though Zhankhvav's mortality rate (40/1000) falls within acceptable limits, Dediapada's rate (83/1000) is high. These high mortality rates could imply a deterioration in animal health services over these years.

Female calf mortality rate (T2) is the ratio of female calves dead to the opening stock plus new calves born or brought into the cooperative during this year. Over the study period, both Dediapada and Zhankhvav have made considerable progress in reducing T2.

Female calf mortality declined from 80/1000 and 63/1000 in 1982-83 to 72/1000 and 52/1000 in 1984-85 for Dediapada and Zhankhvav respectively. The relatively higher mortality rates in Dediapada are responsible for the lower replacement rates obtained (Section 4.6.1). The effectiveness of the AHP in reducing female calf mortality has been more noticeable in Zhankhvav than in Dediapada: the reduction in the former is twice that in the latter.

Table 4.17: Female Calf Mortality Rate (T2)

	1982-83	1983-84	1984-85	Rate of change in percentage
Dediapada	0.0802	0.0879	0.0726	- 9.5
Zhankhvav	0.0637	0.0838	0.0527	-17.27*

* Negative signs for T1 and T2 imply a positive growth.

Given the high mortality rates prevalent in the area before the AHP was introduced, one of the programme's main goals was precisely to reduce this rate. The need to solve this problem has also been recognised by other studies conducted in the tribal belt of South Gujarat. One such study carried out in 1981 by the Bank of India for the Surat District (Anand and Savara 1985: 151) found that calf mortality was unusually high (48%) among the beneficiaries of the loan-scheme. The reasons listed for this high calf mortality rate were: poor knowledge of health care, deliberate neglect of calves, non-availability of prompt veterinary services and malnutrition of the mother.

The goal of the AHP was to tackle these very limitations, and to that extent it has been successful. Given the fact that female calf mortality in Dediapada (7%) and in Zhankhvav (5%) remained well below the figure quoted by Javed and Savara, we may attribute this achievement to the successful implementation of the AHP.

Vaccination rate (T3) measures the number of vaccinations injected as a proportion of the total number of buffaloes. Indicator T3 implicitly assumes that an increase in the vaccination rate will lead to a fall in the mortality rates, especially with respect to female calf-mortality.[7]

From Table 4.18 it can be noted that both cooperatives have recorded an impressive performance over the three-year period. The rate of change in Dediapada is higher than the corresponding rate in Zhankhvav. In 1982-83, animals in both cooperatives were injected only once. By 1984-85, the number of vaccinations that were injected had doubled, in spite of the increased buffalo population. We may therefore conclude that the AHP, through the vaccination programme, has played an important role in reducing mortality rates, especially in terms of female calf mortality.[7]

7. This conclusion is based on the analysis presented in section 4.6.1.

Table 4.18: Current Vaccination Rate (T3)

	1982-83	1984-85	Rate of change in percentage
Dediapada	0.9204	2.49125	170.67
Zhankhvav	0.9479	2.3473	147.63

4.7.2 Breeding Practices

The term practices describes three concrete activities undertaken by the TVWs, their supervisors and the doctor to reduce the number of dry animals in the herd as well as to shorten their dry period. These are insemination, pregnancy detection and treatment of dry, non-breeding animals. These three activities are evaluated with the help of indicators T4, T5 and T6 (Table 4.19). We may remind the reader that, as mentioned in Section 2.3.4, these indicators reflect directly the efficiency or otherwise of the TVWs in performing these activities and, indirectly, the breeding patterns of the herd.

Table 4.19: Breeding Practices

	Breeding Rate (T4)		Pregnancy Rate (T5)		Dry Non-Breeding Rate (T6)*	
	Dedia-pada	Zhan-khvav	Dedia-pada	Zhan-khvav	Dedia-pada	Zhan-khvav
1982-83	0.2738	0.1974	.18870	.2209	.3291	.2603
1983-84	0.3328	0.1973	.1624	.2045	.2271	.2479
1984-85	0.2732	0.2765	.1345	.1990	.2636	.2139
Rate of change in percentage	-0.22	0.40	-28.7	-9.9	-19.9	-17.8

* A fall in the dry non-breeding rate implies a greater percentage of animals in-milk and hence an increase in the milk output.

The breeding rate (T4) refers to the ratio of inseminated buffaloes to the non-pregnant buffaloes. It influences not only the milk yield in the short-run, but also the future herd build-up. It also helps in monitoring the TVWs' efficiency in detecting animals in heat and facilitating their insemination.

The indicator does not exactly measure the number of animals which de facto may have become inseminated, but only those non-pregnant animals reported to have been inseminated under the supervision of the TVWs. From Table 4.20 it can be seen that T4 has fallen marginally in Dediapada over the three-year study period; in Zhankhvav, however, it has increased by as much as 40 per cent.

The pregnancy rate (T5) measures the ratio of the number of detected pregnant buffaloes to the total number of buffaloes. This indicator also helps to evaluate the efficiency of the TVWs in detecting pregnancies. The pregnancy rate, therefore, describes the number of pregnancy detections reported by the TVWs rather than the actual pregnancies in the herd. The fall in this rate experienced by both cooperatives, less in Zhankhvav than in Dediapada, has to be interpreted rather cautiously. The fall in T5 may be the result of a fall in the number of actual pregnancies, or alternatively, it may reflect a certain slackness in the way the TVWs have fulfilled their responsibility in this area. On both counts, the AHP has not performed well.

The dry, non-breeding rate (T6) measures the percentage of unproductive animals in the herd, that is, the relative size of dry and non-inseminated buffaloes. This is the most important indicator in measuring the successful implementation of the TVW's services. A fall in T6 implies a greater number of inseminated or in-milk animals, leading to a rise in the present and future levels of milk output. The fall in T6 in both the cooperatives (Table 4.19) is one of the most significant contributions of the AHP; it implies the successful implementation by the TVWs of the special health services which deal with animals that persistently do not come into heat. The success of the AHP in reducing the number of unproductive animals is also responsible for the rise in the in-milk rates achieved by both cooperatives.

4.7.3 Breeding Behaviour

The breeding behaviour of the buffalo population is evaluated through two indicators: age at first calving (T7) and inter-calving period (T8).

Low productivity of milch animals in India has been attributed to late age at first calving, long calving intervals, short lactation, low average daily yield and low average body weight at birth (Acharya and Huria 1980: 1936-37). We have already dealt with average yields in Section 4.5.3; the analysis of indicators T7 and T8 will cover the effects of the first three reasons for low

productivity enumerated by Acharya and Huria. The last factor, body weight, has not been considered in this study.

Since the services provided by the TVWs under the AHP have been directed to lower the age at first calving and to shorten the calving interval, the analysis will directly result in an evaluation of the effects of AHP on buffalo-productivity. The data for T7 and T8 are presented in Table 4.20 and in Appendices 4.1 and 4.2. Data for T7 and T8 refer only to animals that have been born in the two cooperatives, since it is not possible to obtain reliable information about the birth dates of animals bought from outside.

Table 4.20: Breeding Behaviour

	Age at first calving in months (T7)		Inter-calving period in months (T8)	
	Dediapada	**Zhankhvav**	**Dediapada**	**Zhankhvav**
1982-83	61.05	54.42	21.04	16.70
1983-84	58.40	52.47	20.94	18.82
1984-85	62.67	57.82	22.67	20.39
Rate of change in Percentage	2.70	27.50	7.70	22.09

Age at first calving in Dediapada has fluctuated around 61 months, while in Zhankhvav it has risen from 54 months in 1982-83 to 57.8 months in 1984-85. In both cooperatives, the age at first calving is higher than the national average (50 months) computed in 1980 (T. Shah, Tripathi, A.K., M. Desai 1980: 1408).

The intercalving period in Dediapada has fluctuated between 21 and 22 months, while in Zhankhvav it has increased from 16.7 months in 1982-83 to 20.4 in 1984-85. In 1980, the national average was calculated at 20 months (T. Shah, ibid); this is similar to the intercalving period in Zhankhvav and slightly higher than the one recorded in Dediapada. Appendix 4.1 provides some interesting information about the length of the intercalving period for animals born in the cooperative. In both cooperatives the length of the intercalving period decreases with successive calvings: in 1984-85, the length of the first intercalving period, that is, the length of time between the first and second calving for the Zhankhvav buffaloes was 30.64 months, while the length of the fourth intercalving period was 12 months. The fall in the

intercalving time is greater in Zhankhvav than in Dediapada.

We may therefore conclude that the AHP has not made a discernible impact in lowering the age at first calving which remains above the national average for both cooperatives. On the other hand, the services provided by the TVWs, especially heat detection, insemination and special treatment of dry animals, has succeeded in keeping the intercalving period close to the national average, as well as effecting a considerable reduction in the length of successive calving periods. This has positively affected the productivity of buffaloes in Zhankhvav.

4.7.4 Nutritional Standard of the Herd

The quality and quantity of feed available exercise a powerful influence on the milk yield per animal as well as on the breeding behaviour of the herd. The relationship between feed input and milk output can be explained through the term 'conversion efficiency'. This term refers to the ability of milch animals to convert feed intake into milk: "Conversion efficiency in milch animals is generally measured in terms of the percentage of feed protein intake which is converted into milk" (Nair 1985: A-92). Among the various kinds of milch cattle in India, the low-yielding buffalo shows the highest conversion efficiency: 35% for feed energy utilisation, and 26 per cent for feed protein utilisation. From this point of view, the buffalo is much better adapted to the conditions prevailing in the tribal belt.

In the present study the quantity and quality of buffalo feed has been measured with the help of four indicators: the sale of concentrate feed per buffalo unit (T9), and per cooperator (T10), the surplus feed stock (T11), and the grazing land per adult buffalo unit (T11). Table 4.21 presents the results obtained for these indicators.

Nutritional standards in both cooperatives have worsened over the three year period. The sale of concentrate feed per buffalo unit and per cooperator (T9 and T10) has increased steadily in Dediapada. In Zhankhvav, T10 has declined over the years, but in 1984-85 it was still twice the amount spent by a cooperator in Dediapada.

Utilisation of surplus agricultural by-products for feeding (T11) has increased in Dediapada in 1984-85, and is higher than in Zhankhvav. The improvement in Dediapada implies that tribals do wish to invest in better

animal feed. Re-cycling of agricultural by-products is the optimal alternativ open to them.

Table 4.21: Nutritional Standards

	T9 Sale of Concentrate feed per buffalo unit* (Rs./Year)		T10 Sale of Concentrate feed per cooperator (Rs./Year)		T11 Surplus feed stock per adult byffalo unit (Rs./Year)		T12 Grazing Land per adult buffalo unit (acres)	
	Dedipada	Zhankhvav	Dedipada	Zhankhvav	Dedipada	Zhankhvav	Dedipada	Zhankhvav
1982-83	37.40	N	75.72	322.98	322.81	-	-	-
1983-84	55.76	O	50.16	227.04	368.87	377.06	0.8396	-
1984-85	54.64	T	100.20	210.36	423.38	313.44	0.5873	0.5682
Rate of Change in per-centage	46.09		32.32	-34.86	31.15	-16.87**	-30.00**	

* Since the feeding capacity of young and adult buffaloes is different, a standard unit (buffalao unit) has been calculated by regarding four young buffaloes into one adult buffalo.

** The rate of change with regard to these indicators has a base year that is different from other indicators.

Availability of grazing land (T12) contributes positively to the supply of green fodder. The extent of grazing land has been declining steadily in Dediapada, in 1984-85, the land available for grazing in Zhankhvav was even less than in Dediapada.

The AHP's efforts at improving the health of the buffalo population in Dediapada and Zhankhvav are hampered to a large extent by the non-availability of, and the people's incapacity to invest in, animal feed. This problem of animal feed scarcity is felt all over the country and is probably the biggest obstacle to a large-scale implementation of dairy farming.

Two main views have emerged regarding the seriousness of this problem: some feel that its acuteness has disappeared, and others that it has worsened. Among the exponents of the first view, Nair believes that "the phenomenon of declining productivity of bovine population due to a fall in per capita feed availability ... has been broken in recent years; because of the faster rate of growth in agricultural output, the availability of bovine feed has

been increasing at a more rapid rate than the growth in bovine population" (Nair 1985: A-91). Nair proves this statement on the basis of an estimation of TDN (Total Digestible Nutrients) and DCP (Digestible Crude Protein) obtained from roughage and concentrates. The availability of DCP and TDN increased in the late 70's, and the ratio of TDN to DCP has been declining, which points to an improvement in the quality of feed.

Most experts, on the contrary, believe that the situation has worsened. The traditional way of grazing livestock follows a cyclical pattern that depends on the specific characteristics of the village concerned (Damodaran 1987: A16-17). During the post-harvest season, cattle usually feed on the stubble; later in the year, tank beds are used, and during the monsoon, the available pasture land in the village is used. This pattern has been broken by drought and overgrazing.

The traditional rural Indian milieu was one in which milch cattle were kept essentially for draught power; the small milk-yield was meant for self-consumption mainly in the form of ghee and buttermilk. Because the need for increasing the milk-yield was rarely felt, by-products from farming were sufficient sources of feed; the question of special feed to increase milk-yield did not arise.

All this changed with the introduction of Operation Flood. The new demand for increased milk output placed undue strain on the availability of fodder. Critics of OF point out that this extra burden has arisen partly because of the new emphasis on improved milk output through cross-breeding, as the feed requirements of cross-bred cattle are much higher than those of the indigenous ones. Moreover, the feed mix of exotic milch animals contains a very high proportion of green forage and concentrates. Such feed requirements have aggravated the present shortage.

We have to understand the worsening nutritional standards of Dediapada and Zhankhvav cooperatives in the light of the general fodder crunch in the country, as well as in the context of a South Gujarat tribal society which is witnessing the rapid disappearance of common grazing lands and which does not have sufficient economic means and incentives to buy concentrate feed.

4.5.7 Conclusion

The analysis of target indicators facilitates the final evaluation of the effects of the AHP on the economic performance of the cooperatives. The results obtained in this section permit us to examine the way in which the AHP has affected the objectives described in 4.6.3: the future size of the milch population, the breeding efficiency (in-milk rate), and the productivity per in-milk animal.

This study has measured the impact of the AHP on the future milch population with the help of three indicators: the mortality rate (T1), the female calf mortality rate (T2) and the vaccination rate (T3). The causal linkages work as follows: the medical services provided by the AHP, especially through the vaccination programme, have aimed at decreasing the high mortality rate of buffaloes and female calves; if these target variables have improved, the programme has succeeded in increasing the future productive and reproductive capacity of the herd.

One of the most important aspects of the AHP has been the introduction of systematic vaccination campaigns carried out by the TVWs. The content and methodology of this programme have been described in detail in Section 3.5 and Table 3.3. The success of the programme is unquestionable: in 1982-83 almost all animals in both cooperatives were vaccinated once a year; three years later, a 'representative' buffalo from Dediapada and Zhankhvav had received 2.49 and 2.34 vaccinations per year respectively. On an average, all buffaloes had been vaccinated twice and at least half of them had been injected thrice in a year rendering them more resistant to the more common diseases especially *haemorrhagic septicemia.*

The vaccination drive and the curative services provided for the care of new-born calves have managed to reduce female calf mortality: in Zhankhvav the index fell from 63/1000 to 52/1000, while in Dediapada it decreased from 80/1000 to 72/1000. The effect of the AHP must be analysed not only in terms of these reductions but mainly in terms of the relatively low values of these rates compared with those reported by Anand and Savara (1985: 151) which indicate that the calf mortality rate prevalent among the tribals of Surat district was as high as 480/1000. The succcess of the AHP has been more dramatic in Zhankhvav and it is reflected in the rise of P1 and P2. It is also true that in Dediapada, the fall in the female calf mortality rate has not been able to affect the proportion of female calves to the total stock (P1) which

remained unchanged over the three years, though there was a rise in the calving rate (P2).

Besides vaccinations, the AHP has also provided a wide range of curative services (Section 3.5 and Annexures 3.1 and 3.2) aimed at curbing the high mortality rates among adult animals. The results from our study do not show, however, any significant impact on mortality rates. As a matter of fact, mortality rates have tended to increase marginally in both cooperatives: from 61/1000 to 83/1000 in Dediapada and from 26/1000 to 40/1000 in Zhankhvav. It would not be fair to conclude from this marginal rise that the AHP has entirely failed, and this for two reasons: (i) the services provided by the AHP have managed to keep the rates within an acceptable boundary, and (ii) the study does not consider the first two years of the programme (1980-81 and 1981-82), and hence does not establish any direct comparison with the mortality rate existing before the programme was introduced. This difficulty can be obviated if we take into consideration the data provided by a preliminary study conducted by the BSC in 1982 (Heredero 1983:292). The study shows that in the tribal cooperatives managed by the seven NGDOs (Section 3.2), a total of 4013 buffaloes were distributed over a period of five to six years and, out of these, 1253 animals died. Assuming a five-year period, and an equal distribution during the five years of the additions (distributed buffaloes) and losses (deaths) to the total stock, the mortality rate works out to be 311/1000 per year. It is, therefore, remarkable that by 1982-83 the rate had been brought down to 61/1000 in Dediapada and to 26/1000 in Zhankhvav and that during the following two years the rates remained more or less at those low levels.

An important component of the AHP has been the creation of a cadre of TVWs responsible for helping the members of the cooperatives to increase the breeding efficiency of the animals. This assistance is provided by detecting animals in heat, by getting them inseminated, reporting their pregnancy and taking special care of those animals that persistently remain dry and non-inseminated.

The TVWs' efforts have succeeded in reducing the number of totally unproductive buffaloes. The percentage of dry and non-inseminated buffaloes in the total stock fell from 33 per cent to 26 per cent in Dediapada and from 26 per cent to 21 per cent in Zhankhvav. The fall in the number of unproductive animals has been responsible for raising the breeding efficiency in Dediapada by 35 per cent and in Zhankhvav by 12 per cent.

The degree of responsiveness shown by the TVWs in inseminating the animals in heat and in reporting pregnancies has been measured by indicators T4 and T5. Over the three year period, the TVWs from Zhankhvav have increased the number of inseminations: in 1982-83 they had inseminated 20 per cent of non-pregnant animals, while in 1984-85 they provided this service to 27 per cent of non-pregnant animals. By 1984-85 the percentage of inseminated animals was the same in both cooperatives. The number of pregnancies reported has fallen: over the three year period the percentage of total buffaloes reported pregnant fell from 19 per cent to 13 per cent in Dediapada, and from 22 per cent to 20 per cent in Zhankhvav. If we assume that about 35 per cent of animals calve in a year (Table 4.14), then the TVWs failed to detect 57 per cent pregnancies in Dediapada and 43 per cent pregnancies in Zhankhvav.

The productivity of the buffaloes can be increased by lowering the age at first calving (T7) and shortening the length of the intercalving period (T8). The services provided by the AHP have not achieved this goal. The age at first calving in Dediapada has fluctuated around 61 months, and in Zhankhvav it has risen from 54 to 57 months; in both cooperatives it is higher than the national average (50 months). The length of the intercalving period has increased in both cooperatives though it has remained close to the national average (20 months).

We conclude by attempting answers to two fundamental questions. Has dairy farming improved the economic position of the tribals? , If so, to what extent has the AHP played a positive role in achieving these objectives? The answer to the first question must take into consideration the particular situation faced and the policies adopted by the two cooperatives. The extensive model adopted by Dediapada as well as the low prices paid to its members on account of transportation costs and other overheads are mainly responsible for the failure of dairy farming in improving the economic position of the tribals. As against this, dairy farming in the Zhankhvav cooperative has definitely raised the economic standards of the tribals.

The AHP has played a significant role in raising the breeding efficiency in both cooperatives. It has also succeeded in increasing the size of the future milch population as well as the productivity per in-milk animals. This is especially true in Zhankhvav. We may conclude therefore that the AHP has been responsible for the economic benefits accruing to the members of the Zhankhvav cooperative. The impact of the AHP on the economic perform-

ance of Dediapada cooperative has been negligible. The reason lies in the fact that the AHP has had to operate, as it were, against a policy of low prices paid to the producers.

We have to notice also that the effectiveness of the AHP has been largely dampened by the falling nutritional standards of the buffalo stock. The overall impression is that, even in Zhankhvav, a further rise in productivity and breeding efficiency will not be possible unless feed requirements are substantially increased.

APPENDIX 4.1
DATA REGARDING THE INTERCALVING PERIOD

Dediapada

Intercalving	Average Length (Months)				Average Milk-yield Per Animal (Liters)			
	Upto May 1983	1983-84	1984-85	Mean	Upto May 1983	1983-84	1984-85	Mean
First	22.09	26.73	28.22	25.68	681.38	642.36	610.75	644.83
Second	20.95	22.00	24.86	22.61	678.38	658.37	638.37	658.37
Third	20.08	17.27	17.83	18.39	1151.84	626.37	607.13	795.11
Fourth	-	17.75	19.77	18.76	-	572.75	860.63	716.69

Zhankhvav

Intercalving	Average Length (Months)				Average Milk-yield Per Animal (Liters)			
	Upto May 1983	1983-84	1984-85	Mean	Upto May 1983	1983-84	1984-85	Mean
First	18.14	23.30	30.64	24.03	806.56	760.57	865.97	811.04
Second	13.09	15.20	20.17	16.46	522.87	763.99	906.82	855.81
Third	13.20	16.71	14.65	11.84	1044.00	1049.44	908.42	984.37
Fourth	-	14.50	12.00	13.25	-	1000.00	920.00	960.00

Part B

Social Impact of the Dairy Cooperatives on Tribal Society

Chapter 5

Social Impact and Class Structure

5.1 Introduction

While Part A of this study evaluated chiefly the economic benefits accruing to the cooperatives through dairy farming and the AHP's role in increasing these benefits, Part B examines the *distribution* of these benefits among the tribals of South Gujarat. In other words, this part of our study examines the social impact of the cooperatives, and asks whether they have been instrumental in bringing about a greater degree of equality or whether they have served to further the interests of the richer sections of tribal society.

In order to identify the social impact, the population of each village is divided into five classes. This concept of class does not correspond to its general use in Marxian analysis, but is employed here merely as a functional economic tool to stratify a given population.[1]

5.2 Social Impact

In the present study, the term *social impact* is defined as the effect of dairy farming through the SUMUL pattern of cooperatives on the *distribution*

1. The classification of a village population on the basis of the Marxian category of 'class' has been extensively discussed by Utsa Patnaik (1980: 483-488; 1987: 51-76). The main criterion used to divide various groups into "operational classes" is the net employment of their labour and the amount of self-employment. Other researchers have used more eclectic ways: A. Beteille, (1969: 102-3) describes tenants and land owners as 'classes' but what defines class status in the Marxist sense is "whether the producer exploits the labour of others through obtaining profit, rent or other means, or whether he is self-employed, or whether he himself is exploited" (Patnaik 1987: 8). Hina Sen (1988: 1702) follows more or less the Leninist understanding proposed by P. Sundarayya (1976). From a marketing point of view, a comprehensive classification of various types of rural consumers is provided by V.K. Gaikwad (1972: 159-172) and M. Jha (1988: M-8 to M-16).

of power–especially economic power–in a tribal village. It is assumed that differences in economic power among tribals in a village are positively related to differences in land ownership; hence, the tribal population has been divided into various groups or "classes" on the basis of differences in land holdings. Since (economic) power is shared unequally by these groups, a set of unequal relationships among them is established–what, in a general sense, can be called a social structure.

Being a somewhat recent phenomenon, dairy cooperatives may be considered as a developmental intervention in the existing social structure. The related question that arises is whether the cooperatives have increased, maintained, or reduced the existing social inequalities.

In addition, this second part investigates whether Operation Flood, through SUMUL, can indeed benefit the poorest among the tribals, and whether voluntary organisations committed to this very ideal can succeed in translating this claim of OF into a reality. The introduction into a tribal village of a cooperative on the pattern of SUMUL affects the existing distribution of economic power in a number of ways. Some of these are:

1. Membership in the cooperative
2. Income from milk
3. Utilisation of AHP services
4. Adoption of new dairy practices
5. Milk productivity
6. Adoption of better agricultural techniques
7. Children's education.

The seven factors listed above are some of the important areas in which the cooperatives distribute positive or negative effects among the various groups. The pattern of this distribution either reinforces the existing distribution of power, reproduces it, or alters it. It is in this sense that the present study attempts to measure the social impact of the cooperative with the help of the seven criteria listed above. In other words, if the analysis of a criterion (membership) reveals that the benefits deriving from it have favoured the group cultivating large holdings to the detriment of the other groups, then we conclude that the social impact has been "class-biased" or that cooperative membership has discriminated against the poorer sections, implying thereby a negative social role. Figure 5.1 summarises the argument developed in the following chapters which will elaborate the listed factors and

analyse whether there has been a class-bias in the appropriation of the services offered.

Under each of the above criteria, a set of indicators is employed to carry out the analysis. These indicators are listed and defined (for easy reference) in Appendix 5.1.

5.3 The Sample Data

The data used in this part of the study have been collected through a specially designed questionnaire. This questionnaire, administered to the cooperative members, elicited information regarding landholdings, total income and cash obtained from milk, adoption of practices in dairying and agriculture, and the proportion of children going for grazing. Data regarding buffalo health and utilisation of services were obtained from the cooperative offices and TVW records.

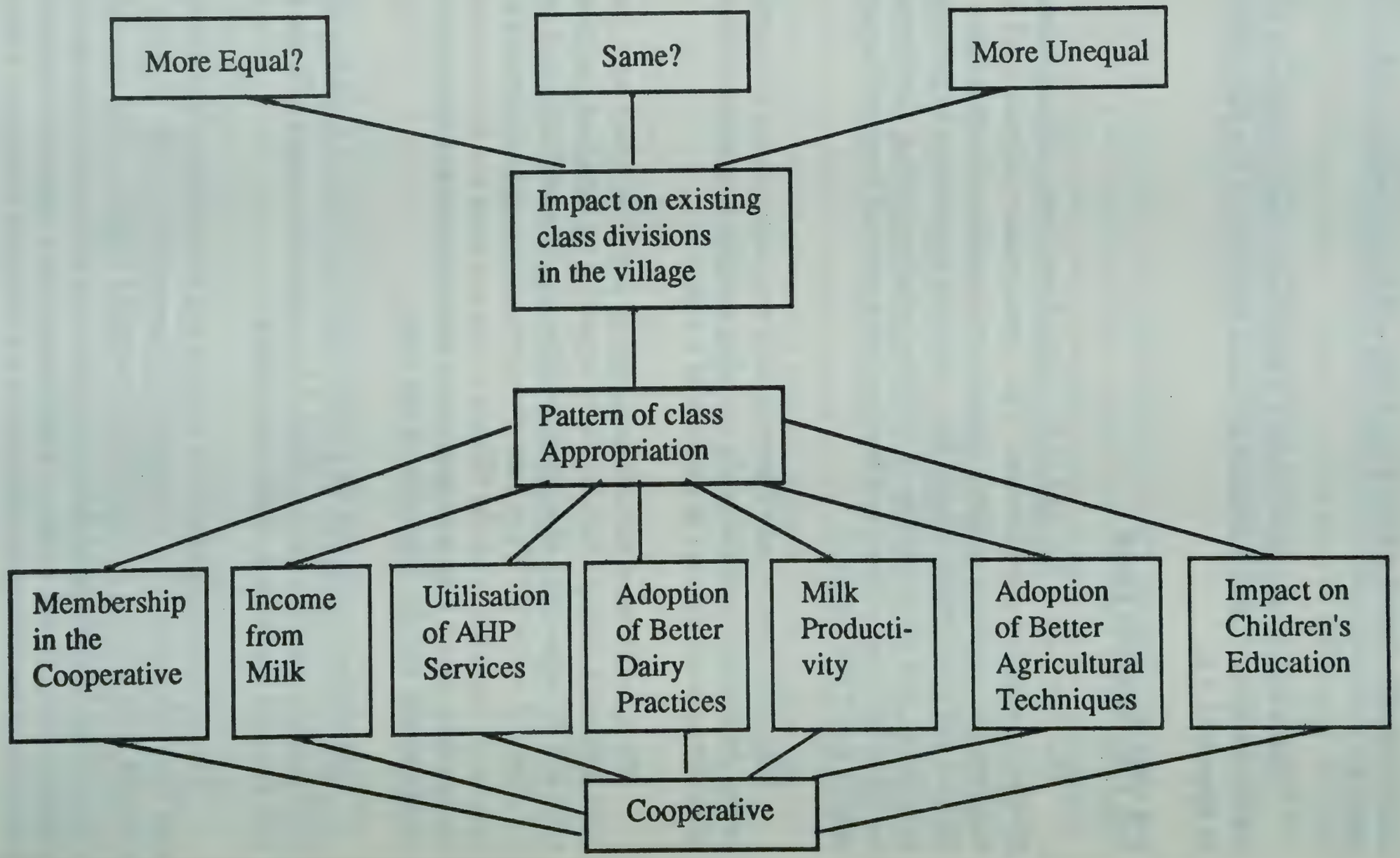
The questionnaire was drawn up with two aims in mind: (i) simplicity, so that the answers could be easily recorded, and (ii) compactness, so that the filled forms could be kept in the form of a register.

The questionnaire was administered by the TVWs who were specifically instructed during a one-day camp regarding the details of the questionnaire and the importance of accurate information. The credibility and respect commanded by the TVWs in their own communities, gained through a long drawnout interaction with the villages on the one hand and the cooperatives on the other, went a long way in ensuring the authenticity of responses to the questionnaire and the reliability of the data.

The village sample for the present study was selected from the talukas of Dediapada and Zhankhvav. Table 5.1 presents the sample villages along with the milk societies to which they belong.

The representative sample of villages was chosen taking into consideration both economic and geographical characteristics. The majority was selected from the less economically developed villages. The ten villages chosen from Dediapada taluka are representative of the varying geographical characteristics in the taluka. Khokhraumar was chosen because of its proximity to the main cooperative office at Dediapada; Gangapur, Ambavadi and Kevdi are situated in a remote, hilly, thickly-forested region north-east of

Figure 5.1: Social Impact



Dediapada; Gadi and Nanisingloti lie in the arid areas towards the north-west; and Almavadi and Kunbar are closer to the plains in the south (Figure 5.4).[2]

Table 5.1: The Village Sample

Village	Taluka	Milk Society	
1. Almavadi	Dediapada	Dediapada	
2. Ambavadi	Dediapada	Dediapada	
3. Khokhraumar	Dediapada	Dediapada	
4. Nani Singloti	Dediapada	Dediapada	
5. Gadi	Dediapada	Dediapada	
6. Relwa	Dediapada	Dediapada	
7. Kunbar	Dediapada	Dediapada	
8. Kevdi	Dediapada	Dediapada	
9. Gangapur	Dediapada	Dediapada	
10. Boridabara	Dediapada	Dediapada	
11. Umarkhadi	Mangrol	Umarkhadi	(Zhankhvav)
12. Umarjhar	Mangrol	Umarjhar	(Zhankhvav)
13. Dadakui	Mandavi	Dadakui	(Zhankhvav)
14. Katkuva	Mandavi	Katkuva	(Zhankhvav)
15. Karutha	Mandavi	Karutha	(Zhankhvav)

The cooperative societies served by the central office in Zhankhvav are situated in the Mangrol and Mandavi talukas of Surat district (Figures 5.2 and 5.3). Five cooperative societies have been selected for the present study: two in Mangrol taluka and three in Mandavi taluka.

It should be noted at this point that for the rest of this study a 'village' is considered as a "cooperative unit." It is immaterial whether it is a registered society like the ones from Zhankvav, or whether it belongs to a registered society outside the village like the ones from Dediapada.

Within each village, *all* the cooperative members have been interviewed. Although the cooperative members are individuals, in the present study they are considered to belong to separate households. The basic unit for analysis is termed *member household* Data regarding non-member house-

2. This sample of ten villages was selected from a total of forty-three villages in Dediapada Taluka. Appendix 3.3 gives a list of 38 villages as catalogued by the 1981 Census of India. Although they are members of the Dediapada dairy cooperative, the remaining five villages have not been listed by the Census. Village Boridabara has been selected from among these five villages.

holds was also collected to ascertain the reasons for not joining the cooperatives. The percentage of non-members sampled is proportional to the size of each village. For this reason, the sample size varies over the villages.

5.4 Socio-economic Characteristics of the Village Sample

As was mentioned earlier, the sample villages belong to Dediapada taluka of Bharuch district and Mangrol and Mandavi talukas of Surat district. All the villages in Dediapada taluka belong to a single cooperative society with central offices and services located at Nivalda, a village close to Dediapada, the taluka headquarters. The villages situated in Mangrol and Mandavi talukas have separate cooperative societies with a central office at Zhankhvav.

In this section we examine the comparative level of development achieved by these villages with the help of the development indices indicated in Table 1.1. It may be mentioned here that these do not lend themselves to rigorous scientific analysis, and have been used more as pointers of development rather than as formal indicators to establish definitive conclusions.

5.4.1 Dediapada Villages

On the basis of these indicators the sample villages from Dediapada fall into the following three groups (Appendices 5.2 and 5.3):

(1) the group of *least developed* villages comprises Gadi, Gangapur, Kokhraumar and Nanisingloti; cultivable land in these villages is about 50 per cent or less of the total land[3]; literacy rates are lower than the average for the whole taluka[4]; the proportion of cultivators is relatively high and the percentage of agricultural workers relatively low;[5] none of the villages is electrified and, excepting Gangapur which has a primary health and family planning centre, none has any medical facility;

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3. Gadi and Gangapur represent extreme cases since cultivable land is a meagre 8% and 23% respectively.

4. In Gadi and Gangapur illiteracy is rampant: only 6% of the total population of Gadi and 5% of the total population of Gangapur is literate. In Nanisingloti and Khokhraumar the percentage of literates is 11% and 19% respectively, well below the average literacy rate (23%) for the whole Dediapada taluka.

5. In Gadi, Nanisingloti and Khokhraumar cultivators constitute 70%, 80% and 73% of total main workers, while agricultural labourers are 20%, 8% and 19% respectively.

(2) the group of *more highly developed* villages comprising Almavadi, Ambavadi, and Kevdi, in the first of which cultivable land forms 86 per cent of the total land, and in the latter two of which almost all land is cultivable; some cultivable land (2.47 per cent) is under irrigation in Almavadi; literacy rates are higher than the taluka average;[6] the proportion of cultivators in Ambavadi is less than the proportion of agricultural workers;

(3) the *middle group* comprising Relwa and Kunbar falls somewhere between the two groups discussed above.

5.4.2 Zhankhvav Villages

Appendices 5.4 and 5.5 present the socio-economic characteristics of the sample villages located in Mangrol and Mandavi talukas associated with the Zhankhvav office.

It is not possible to make a neat classification of these villages in Zhankhvav in terms of levels of development because the data regarding these five villages does not offer such clear lines of demarcation. For example, we would expect that a large proportion of cultivable land (low proportion of forest land) would normally be associated with relatively high levels of literacy. This is not the case in these five villages. The sample villages of Mangrol (Umarkhadi and Umarjhar) have a higher proportion of cultivable land but a lower literacy rate than the sample villages of Mandavi taluka (Dadakui, Katkuva and Karutha), despite the fact that, at the district level, Mangrol taluka records both a higher percentage of cultivable land as well as a higher literacy rate than Mandavi. To that extent, Umarkhadi and Umarjhar may not be considered as 'representative' villages of Mangrol taluka.

Among the five villages selected from the Zhankhvav cooperative, Umarkhadi and Umarjhar (Mangrol taluka) have the largest proportion of

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6. Almavadi is a case apart since literates form 40% of the total population. Ambavadi is a typical example of a tribal village in a process of transition from an economy dominated by self-subsistence producers to one in which wage-labour becomes the most important production relation. Unlike all the other villages where almost the entire population is tribal, in Almavadi, one-third of the population is non-tribal. Almost half the population is listed as non-workers and half of those who work during a great part of the year are agricultural labourers. Ambavadi is also the only village having electricity and medical facilities. In short, as the village loses its tribal identity by being integrated into the market economy, the proportion of marginalised tribals increases.

cultivable land: 78 per cent and 93 per cent respectively; literacy rates, on the other hand, are the lowest: 10 per cent and 7 per cent respectively, well below the average (36 per cent) for Mangrol taluka. The "atypical" character of these two villages is also apparent in the proportion of cultivators and agricultural workers: the percentage of cultivators and agricultural workers in the taluka is 40 per cent and 42 per cent respectively, while in these two villages the trend is reversed: 55 per cent and 43 per cent in Umarkhadi and 90 per cent and 8 per cent in Umarjhar.

Umarkhadi follows more closely the change in production relations that has taken place in the whole taluka: transformation of forest into cultivable land and a growing proportion of agricultural workers, corresponding to a fall in the percentage of cultivators. In Umarjhar, production relations are typical of a subsistence economy of self-producers.

The analysis of the three villages in Mandavi taluka shows that only about half of their total land is cultivable and hence their traditional forest habitat has been preserved. Literacy rates are moderately high. With the exception of Katkuva, production relations in Dadakui and Karutha follow the pattern of a subsistence economy: a very high proportion of cultivators and a low percentage of agricultural workers.

In short, these five villages of Mangrol and Mandavi talukas associated with the dairy office in Zhankhvav may be characterised as follows: the three villages in Mandavi taluka have still a fair amount of forest land and record a moderate level of literacy; in three villages—Umarjhar (Mangrol), Dadakui (Mandavi) and Karutha (Mandavi) the proportion of cultivators is above 80 per cent; in Umarkhadi (Mangrol) it is 55 per cent and in Katkuva (Mandavi) 37 per cent; in the other two villages, Umarkhadi (Mangrol) and Katkuva (Mandavi), the percentage of cultivators is relatively low: 55 per cent in Umarkhadi and 37 per cent in Katkuva; in these last two villages, therefore, the traditional relations of production have changed into a new type of economic relationship based on wage-labour.

5.5 Effective Operational Land (EOL) and Class Structure

In the present study an assumption is made that differences in landholding are the main reason for the existing socio-economic inequalities. This assumption is based on theoretical and practical considerations. Land ownership and/or cultivated area is generally positively correlated with other

immovable assets (house, etc.) and with movable assets like draught animals, cattle and agricultural implements. In order to simplify the questionnaire only land has been considered. As subsistence from the forest produce becomes more uncertain, more and more tribals are left with land and labour-power as their only available assets. In this new situation, as the social and economic value of land rises, a new process of land alienation has started whereby many tribals are forced to part with their small holdings. Though we have assumed that land is always an asset, there may be cases when it turns out to be an economic liability. Given the low levels of productivity prevailing in the hilly tracts where the tribal population is concentrated, many small and marginal farmers find it more profitable to become wage earners than to cultivate their meagre holdings–provided employment is available. This fact, rather than invalidating our assumption that differences in landholding are the main source of inequality, strengthens it, especially if we consider the increasing gap between the top and the bottom groups.

In order to classify the tribal population into various economic groups (classes) on the basis of their landholdings we found it convenient to evolve a more realistic concept of landholding called *"Effective Operational Land"* (EOL). The term refers not only to the legally owned land but also to the land cultivated under sharecropping; it also takes into consideration differences arising from single or multiple cropping patterns. Formally, the EOL is defined as follows:

EOL = (i) Owned land +

(ii) Hired land *minus* rent +

(iii) Irrigated land into the number of crops *minus* one.

This definition of EOL has two important features:

(i) It deals with the *effective* amount of land cultivated by a household, that is, the actual amount of land under its control and supervision for purposes of agricultural production. Under this definition, hired or share-cropped land, or land encroached upon, becomes part of the effective operational holding.

(ii) It is an attempt to homogenize lands of varying productivity (irrigated/unirrigated) as well as different types of rent payments (money/kind) into one *average unit*: an acre of EOL.

The various terms used in the definition of EOL are explained below:

(i) *Owned land* refers to land which the cultivator legally owns, *plus* forest, panchayat, or government land which has been encroached upon, and is being cultivated.

(ii) *Hired land* refers to the amount of share-cropped or hired land for which rent is paid in money. If payment for sharecropping is made in kind (e.g. half the produce), then half the area (in acres) of the share-cropped (hired) land is deducted from the total hired land. When rent is paid in cash, its equivalent in acres is calculated on the basis of the value of the crop. This amount is converted into acres by calculating the equivalent value of output that it produces. For example, if Rs.1,000 is paid as rent for the hired land, then, using an "average" price for the crop grown on the hired land, we may estimate that it is equivalent to the value of output produced on one acre of land. Hence, one acre is deducted from the total amount of hired land.

(iii) *Irrigated land* is usually cultivated twice or thrice a year. Irrigation therefore enhances the productivity of the landholding. This factor is taken into account by multiplying the amount of irrigated land by the number of crops grown *minus* one, so as to avoid double counting.

The concept of EOL clearly defines the amount of effective land which a household cultivates. This amount of effective landholding forms the basis for the classification of the village households into the following groups or classes.

Group/Class		EOL (acres)
1. Landless Labourers		0
2. Marginal Farmers	Class A	0 to 2
3. Small Farmers		2 to 5
4. Medium Farmers		5 to 10
5. Large Farmers	Class B	10 and above

Two further classifications are used to capture more easily the degree of inequality existing in a village. *Class A* represents the poorest and economically more dependent sections of the village (landless labourers, marginal and small farmers). *Class B* represents the richest farmers as well as those economically less dependent (medium and large farmers).

5.6 Class Distribution over the Sample Villages

Landless labourers form numerically the largest class; they constitute almost 37 per cent of the total number of households. Table 5.2 presents the percentage distribution of landless households in the villages.

Table 5.2: Landless Labourers

(As percentage of total population)

Small (0 - 20)		Average (20 - 50)		Large (Above 50)	
Umarjhar	0.45	Karutha	21.00	Gangapur	57.00
Relwa	7.00	Dadakui	27.00	Umarkhadi	60.00
Nani Singloti	17.00	Katkuva	28.00	Kevdi	60.00
		Ambavadi	29.00	Almavadi	60.00
		Boridabara	30.00	Gadi	65.00
		Kunbar	31.00		
		Khokhraumar	37.00		

Marginal Farmers form only 5 per cent of the total number of households, and hence they are not numerically important. Only in four villages do they constitute more than one-fourth of the population: Relwa (27 per cent), Ambavadi (32 per cent), Dadakui (38 per cent), and Katkuva (38 per cent) (Table 5.3). In all villages except Umarjhar, the proportion of landless and marginal farmers together is greater than one-third of all households. In fact, in nine (out of the fifteen) villages, the proportion is more than half.

Small Farmers are numerically significant. They form the second largest group: 24 per cent of all the households. It is interesting to note that the villages (Umarkhadi, Almavadi, Gangapur, Kevdi and Gadi) in which the percentage of small farmers falls below twenty are those which also have a high percentage (more than sixty) of landless and marginal farmers (Table 5.4). The converse also holds true: Relwa has the highest proportion (49 per cent) of small farmers and a low proportion (7 per cent) of landless labourers. The significance of this relationship will be discussed later.

Table 5.3: Marginal Farmers

(As percentage of total population)

0 - 15		Above 15	
Umarjhar	4.53	Katkuva	37.65
Umarkhadi	10.19	Khokhraumar	16.81
Almavadi	8.05	Dadakui	37.50
Kevdi	13.01	Nani Singloti	18.31
Karutha	12.87	Relwa	26.37
Gangapur	7.22	Ambavadi	31.71
Kunbar	11.77		
Gadi	2.78		
Boridabara	8.45		

Table 5.4: Small Farmers

(As percentage of total population)

0 - 20		Above 20	
Umarkhadi	19.98	Umarjhar	23.08
Almavadi	12.64	Katkuva	26.54
Kevdi	16.26	Khokhraumar	30.25
Gangapur	17.53	Karutha	34.65
Gadi	15.28	Dadakui	27.08
		Kunbar	25.88
		Boridabara	28.17
		Nani Singloti	23.94
		Relwa	49.25
		Ambavadi	31.71

Medium Farmers form 16 per cent of the total population (Table 5.5). In terms of numerical strength, they are as unimportant as the marginal farmers in the social structure of the area. They are relatively important in Umarjhar (39 per cent), Kunbar (24 per cent) and Nani Singloti 24 per cent)

Large Farmers are relatively few, only 8 per cent of the total number of households (Table 5.6). Only in Umarjhar and Nani Singlotido they form a substantial part of all households: 33 per cent and 17 per cent respectively. At the other extreme are Umarkhadi, Katkuva, Kevdi, and Dadakui in which less than 2 per cent of the population are large farmers.

Table 5.5: Medium Farmers

(As percentage of total population)

0 - 20		Above 20	
Umarkhadi	6.02	Umarjhar	38.91
Almavadi	12.07	Karutha	27.72
Katkuva	6.17	Kunbar	23.53
Kevdi	10.57	Boridabara	22.53
Khokhraumar	12.61	Nani Singloti	23.94
Gangapur	13.40		
Dadakui	7.29		
Gadi	11.11		
Relwa	13.45		
Ambavadi	2.44		

Table 5.6: Large Farmers

(As percentage of total population)

0 - 10		Above 10	
Umarkhadi	0.46	Umarjhar	33.03
Almavadi	6.90	Boridabara	11.27
Katkuva	1.85	Nani Singloti	16.90
Kevdi	0.81		
Khokhraumar	3.36		
Karutha	3.96		
Gangapur	5.16		
Dadakui	1.04		
Kunbar	8.24		
Gadi	5.56		
Relwa	2.91		
Ambavadi	4.89		

To arrive at a more comprehensive picture of the class structure in the sample villages, we examine the distribution of population according to the two broad groups defined earlier: Class A (landless labourers, marginal and small farmers) and Class B (medium and large farmers). In all the villages surveyed, three-fourths (76 per cent) of the population fall into Class A and one-fourth into Class B. In nine villages the percentage of households belonging to Class A ranges from 80 to 92 per cent; in four villages it ranges from 59 to 68 per cent; only in Umarjhar is the proportion of Class A as low as 28 per cent.

From the above discussion it is possible to conclude that the class-wise distribution of the population is skewed towards the poorer Class A. This conclusion has an important economic meaning: 75 per cent of the tribal population (the proportion of Class A) surveyed belongs to the poorer group and they probably live below or hover around the poverty line.

A significant proportion of the population comprises landless labourers (37 per cent). The largest population of landless labourers is concentrated in less economically developed villages like Gangapur and Gadi; they are also found in developed villages with emerging capitalist relations like Almavadi.

We may finally note that small farmers constitute an important group. This group is the source from which marginalisation takes place and landlessness arises. We have already noted that villages which have a relatively high number of landless and marginal farmers have a decreasing proportion of small farmers. This may be an indication of the process of marginalisation taking place in the tribal belt of Gujarat: a fall in the number of small farmers represents an increase in the growing army of the landless.

One final conclusion needs to be mentioned. In Umarjhar (Mangrol), the class structure is skewed towards the rich, since 72 per cent of its households belong to Class B. As we shall presently see, it is also the village having the lowest degree of inequality.

5.7 Degree of Inequality

In the previous section, we concluded that 75 per cent of the sample village population belongs to the poorer classes. In order to analyse the degree of economic inequality between the various classes, we examine the percentage of EOL under the control of each class.

Table 5.7: Class Distribution of EOL and population

Class	% in total population	% in total EOL
Landless	36	–
Marginal Farmers	15	7.61
Small Farmers	24	25.55
Medium Farmers	16	33.70
Large Farmers	8	33.13

From the above table, it is clear that three-fourths of the population (Class A) controls only one-third of the land, while one-quarter of the population (Class B) controls two-thirds of the EOL. If we consider only marginal and small farmers, 39 per cent of the population owns 33 per cent of the EOL, whereas the medium and large farmers (24 per cent of the population) own 67 per cent of the EOL: medium and large farmers control almost thrice as much EOL as their proportional representation in the village population.

To analyse the extent of inequality in the villages, a simple Inequality Index (INEX) has been constructed. The INEX is defined below:

$$\text{INEX} = \frac{\text{LHR (B)}}{\text{LHR (A)}}$$

where LHR denotes the Land Household Ratio, so that

$$\text{LHR (A)} = \frac{\text{EOL controlled by Class A}}{\text{No.of households in Class A}} \quad \text{and}$$

$$\text{LHR (B)} = \frac{\text{EOL controlled by Class B}}{\text{No.of households in Class B}}$$

The INEX depicts the degree of inequality between the rich (Class B) and the poor (Class A) in terms of acres owned per household. A value of INEX equal to one implies that no inequality exists between the two classes; INEX values greater than one indicate inequalities in favour of rich households.

Table 5.8 presents the INEX obtained over the fifteen sample villages.

The values of the INEX over the sample villages are plotted in Figure 5.5. The horizontal line drawn with an intercept equal to one depicts the line

Table 5.8 The Inequality Index(INEX)

Village (Cooperative)	D/Z	LHR A	LHR B	(LHR B/LHR A)	INEX
Umarjhar	(Z)	3.57	9.42	2.64	
Relwa	(D)	2.52	8.45	3.36	
Karutha	(Z)	2.13	8.07	3.78	
Katkuva	(Z)	1.73	7.38	4.27	
Khokhraumar	(D)	1.71	8.71	5.10	
Dadakui	(Z)	1.77	9.31	5.25	
Boridabara	(D)	1.77	9.96	5.64	
Ambavadi	(D)	1.46	8.33	5.69	
Nanisingloti	(D)	2.24	13.10	5.90	
Kunbar	(D)	1.55	9.66	6.22	
Umarkhadi	(Z)	0.99	7.64	7.73	
Kevdi	(D)	1.05	8.71	8.32	
Gangapur	(D)	1.02	9.27	9.11	
Gadi	(D)	0.77	9.25	12.08	
Almavadi	(D)	0.82	10.74	13.15	
Dediapada	(D)	1.15	10.11	8.77	
Zhankhvav	(Z)	1.73	9.00	5.19	

of perfect equality. The part of the vertical lines lying above the horizontal line measures the degree of inequality in each village; the greater the length of the vertical line the higher the degree of inequality existing in each village.

Inequality is highest in village Almavadi where the rich have thirteen times more EOL than the poor. At the other extreme is Umarjhar where the inequality is comparatively low at 2.6. From the figure we conclude that inequality is lower in Umarjhar, Relwa, Karutha and Katkuva. Khokhraumar, Dadakui, Boridabara, Ambavadi, Nani Singloti and Kunbar are classified as the medium inequality villages as their INEX ranges from 5.10 to 6.22. Five of the fifteen sample villages are classified as high inequality villages as their INEX ranges from 7.73 to 13.15. It is revealing to note that the level of inequality in the less developed villages of Dediapada (8.77) is higher than in the more prosperous villages of Zhankhvav (5.19).

The results of this study show that dairy farming and the AHP have operated not only in areas where the level of economic development is very low, but also in villages where economic inequality seems to go hand in hand with poverty. The following chapters will examine the specific contribution of dairy farming and the AHP in redressing this inequality and benefiting the poorest sections of tribal society.

APPENDIX 5:1
INDICATORS PART B

Sl. No.	Section where it is used	Indicator	Definition/Formula	Purpose
1.	5.5	Effective Operational Land holding (EOL) (acres)	EOL = Owned Land + Hired land *minus* rent + Irrigated land *into* the number of crops *minus* one	To classify the tribal population into various economic groups (Classes) Class EOL Landless Labourers = 0 Marginal Farmers = 0 to 2 Small Farmers = 2 to 5 Medium Farmers = 5 to 10 Large Farmers = 10 and above
2.	5.7	Inequality Index (INEX)	$INEX = \frac{LHR\ (B)}{LHR\ (A)}$ where LHR denotes the Land Household Ratio, so that $LHR(A) = \frac{\text{EOL controlled by Class A}}{\text{No.of households in Class A}}$ $LHR(B) = \frac{\text{EOL controlled by Class B}}{\text{No.of households in Class B}}$	To analyse the degree of economic inequality in each village.
3.	6.3	Discrimination Measure (DM)	DM = I - II where, I = Percentage of total households in a village belonging to a particular class/group II = Percentage of total cooperative member-households in a village belonging to the same class/group.	To analyse whether or not the class-distribution of members within the cooperatives reproduces the class-distribution of households within the village

Appendix 5.1 contd.

Sl. No.	Section where it is used	Indicator	Definition/Formula	Purpose
4.	7.2.2	Ratio of milk income to total income (R1)	$R1 = \frac{MI}{\frac{MI + A^1}{4}}$ MI = Value of total milk-income $A1$ = Value of agricultural output $A2$ = Total income obtained from agricultural labour $A3$ = Total income obtained from non-agricultural labour $A4$ = Total income obtained from other sources, for example the sale of wood	To measure the relative importance of MI in total income
5.	7.2.2	Ratio of milk cash to total cash (R2)	$R2 = \frac{MC}{\frac{MC + Ai}{5}}$ $A5$ = Value of marketed agricultural surplus	To measure the relative significance of milk-cash in total cash
6.	8.1	Composite Utilisation Index (CUI)	$CUI = \frac{\sum_{i=1}^{4} ViWi}{4} \times (1000)$ $U1$ = Vaccination rate $U2$ = Treatment rate $U3$ = Insemination rate $U4$ = In-milk rate $W1$ = 0.25 $W2$ = 0.20 $W3$ = 0.15 $W4$ = 0.40	To rank villages and classes according to the level of utilisation of these services

APPENDIX 5.2
SOCIO-ECONOMIC PROFILES OF SAMPLE VILLAGES
(Dediapada)

Village	% of forest land to total land	% of cultivable land to total land	% of irrigated land to total land	% of literates to total population	% of non-workers to total population	% of cultivators to main workers	% of agricultural labourers to main workers
Gadi	80.85	8.48	0.10	5.08	47.76	77.52	20.12
Nani Singloti	20.52	54.24	0.00	10.74	47.09	80.00	7.83
Khokhraumar	38.48	57.47	0.10	19.09	37.81	73.30	18.85
Gangapur	70.68	23.23	0.10	5.90	36.19	41.79	54.48
Kunbar	46.59	48.69	0.10	25.78	48.29	61.88	32.55
Almavadi	0.10	96.99	0.10	40.03	42.87	56.86	28.92
Kevdi	0.10	97.81	0.10	30.22	41.92	69.36	23.33
Ambavadi	6.33	89.53	2.47	34.15	48.91	41.32	50.16
Relwa	0.10	74.81	0.10	17.93	34.28	69.33	28.83
Dediapada	55.60	31.10	1.50	22.05	42.76	67.73	22.70

Source : Census of India, 1981.

Note : Village Boridabara does not appear in this table as it is one of the five villages not covered by the Census.

Classification according to 1981 Census.

Total land = forest, cultivable and non-cultivable
Total population = Total workers and non-workers
Total workers = Marginal and Main workers
Main workers = cultivators, agricultural labourers, house industries and other workers.

Definitions

Main workers = those who have worked for six months or more in any economically productive activity
Non-workers = those who had no economic activity during the year, either because they could not do it (old people, children) or because they did not get it.
Cultivators = those who cultivate (through direction and supervision) owned land or leased land from government
Agricultural = Main workers who work in somebody's land for labourers wages.

APPENDIX 5.3
AVAILABILITY OF AMENITIES
(Dediapada Taluka)

Name of Village	Educational (Primary/ Secondary)	Drinking Water (Well/ Handpump)	Post and Telegraph (Post Office)	Communications (Bus Stop)	Power Supply	Approach to Village	Medical (PHS, FPC, CHW, D)
Gadi	1	1	-	-	-	KR	-
Nani Singloti	1	2	-	1	-	PR	-
Khokhraumar	1	1	-	1	-	KR	-
Gangapur	1	1	-	1	-	PR	PHS,PPC
Kunbar	1	1	-	-	-	KR	-
Almavadi	2	1	1	1	ED	KR	CHW
Kevdi	1	1	-	1	-	PR	-
Ambavadi	1	2	1	1	EA	KR	PHS,FPC, CHW,D
Relwa	1	1	-	-	-	-	-
Dediapada Taluka	P=128 H= 6	W=131 HP= 2	P.O.=33	BS=69	Power=23 (available)	-	PHS=13, FPC=14, CHW=37, D =8

ED = Electricity for Domestic Purposes
EA = Electricity for All Purposes
KR = Kachcha Road
PR = Pucca Road
PHS = Primary Health Sub-Center
FPC = Family Planning Center
CHW = Community Health Worker
D = Dispensary

APPENDIX 5.4
SOCIO-ECONOMIC PROFILES OF SAMPLE VILLAGES

(Mangrol and Mandavi Talukas)

Village	% of forest land to total land	% of culti-vable land to total land	% of irri-gated land to total land	% of lite-rates to total popu-lation	% of non-workers to total popu-lation	% of culti-vators to main workers	% of agri-cultural labourers to main workers
Mangrol Taluka	8.98	83.27	4.76	36.29	52.94	39.78	42.13
Umarkhadi	14.46	78.05	0.00	10.29	47.55	54.93	42.61
Umarjhar	0.00	92.78	0.00	6.69	61.03	90.17	8.48
Mandavi Taluka	25.00	66.75	5.20	33.70	48.52	48.52	29.43
Dadakui	38.09	60.26	3.77	32.85	36.93	89.52	5.65
Katkuva	53.01	46.65	0.00	17.32	43.20	37.43	53.80
Karutha	48.23	49.76	0.00	23.59	35.28	79.44	15.89

Source : Census of India, 1981.

Note : Village Boridabara does not appear in this table as it is one of the five villages not covered by the Census.

Classification according to 1981 Census.

Total land = forest, cultivable and non-cultivable
Total population = Total workers and non-workers
Total workers = Marginal and Main workers
Main workers = cultivators, agricultural labourers, house industries and other workers.

Definitions

Main workers = those who have worked for six months or more in any economically productive activity

Non-workers = those who had no economic activity during the year, either because they could not do it (old people, children) or because they did not get it.

Cultivators = those who cultivate (through direction and supervision) owned land or leased land from government

Agricultural labours = Main workers who work in somebody's land for labourers wages.

APPENDIX 5.5
AVAILABILITY OF AMENITIES

(Mangrol and Mandavi Talukas)

Name of Village	Educational (Primary/ Secondary)	Drinking Water (Well/ Handpump)	Post and Telegraph (Post Office)	Communications (Bus Stop)	Power Supply	Approach to Village	Medical (PHS, FPC, CHW, D)
Umarkhadi (27)	P	W	-	BS	-	KR	PHS, FPC
Umarjhar (29)	P	W.Tk	PO	BS	-	KR	-
Mangrol Taluka	P=150 HC= 1	149 1	56	97	60	-	PHS=13, FPC=15, D = 2, H = 3, CHW= 9
Dadakui (10)	P	W	-	BS	-	KR	CWC
Katkuva (65)	P	W	-	BS	-	KR	CWC,CHW
Karutha (100)	P	W	-	-	-	KR	-
Mandavi Taluka	P=172 H= 8 Tr= 3	132 2	41	91	39	-	CWC=23 CHW=12 D = 7 H = 1 FPC=14

KR = Kachcha Road
PHS = Primary Health Center
FPC = Family Planning Center
D = Dispensary
H = Hospital
CHW = Community Health Worker
CWC = Child Welfare Center

Figure 5.2: Map of Mandvi Taluka

Figure 5.3: Map of Mangrol Taluka

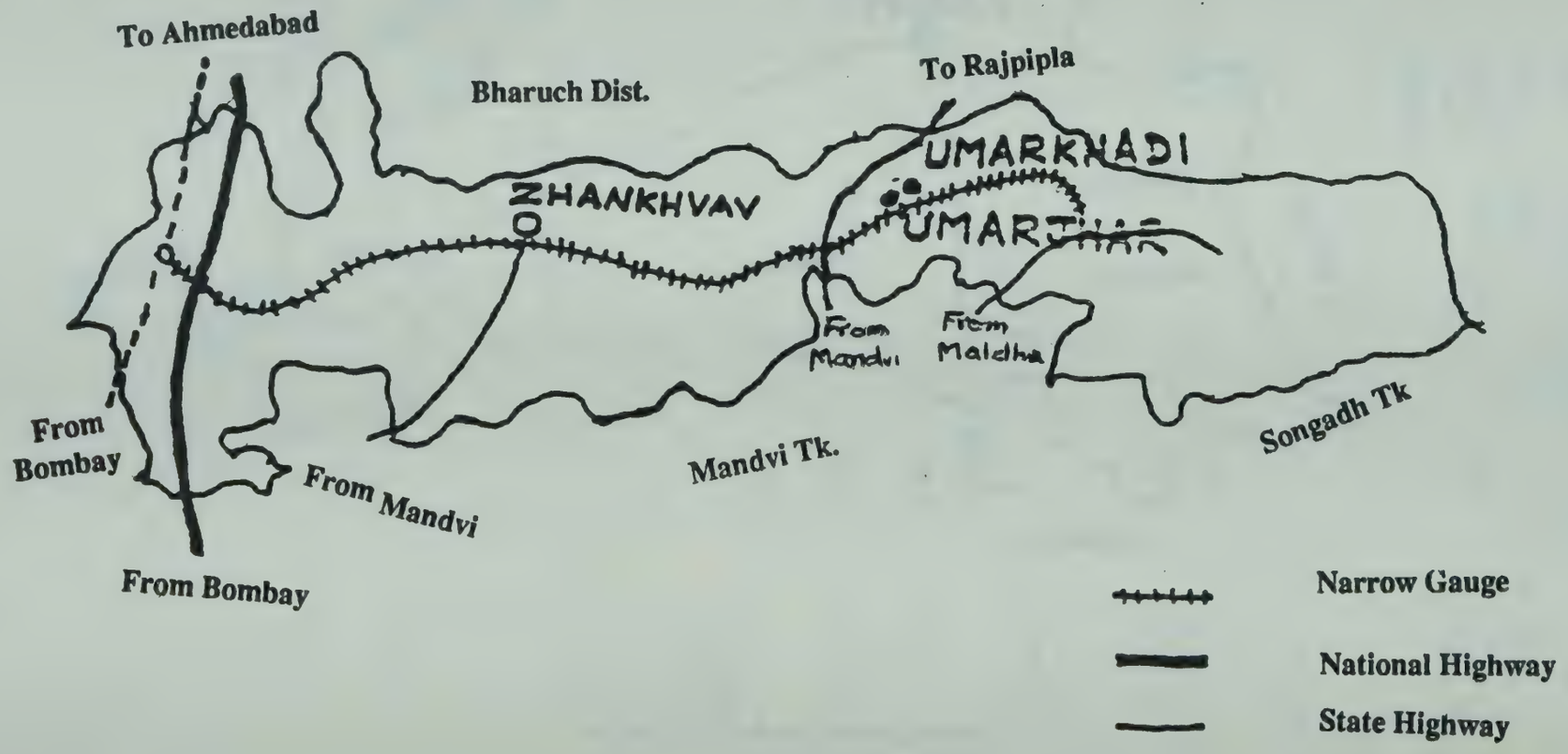
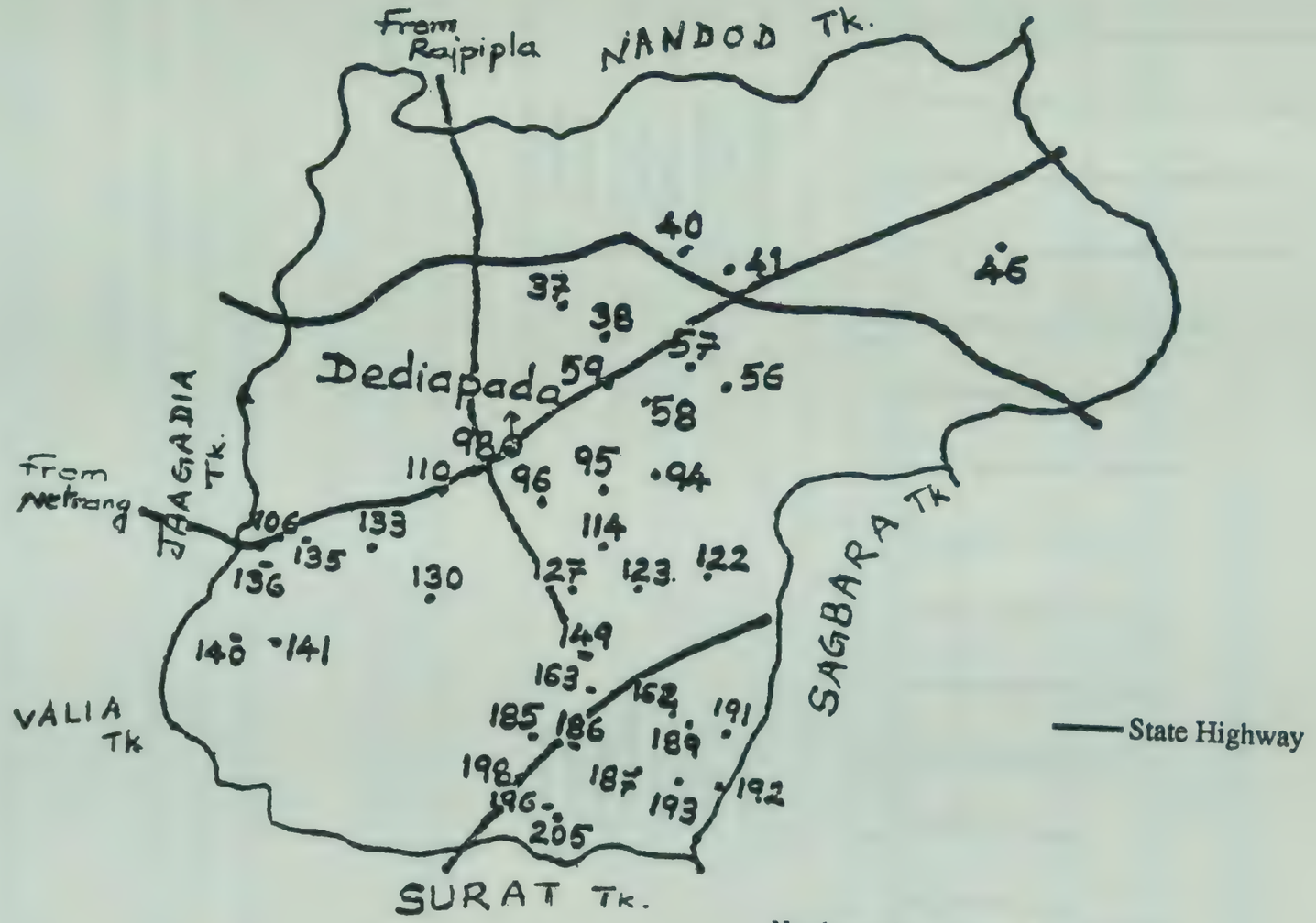
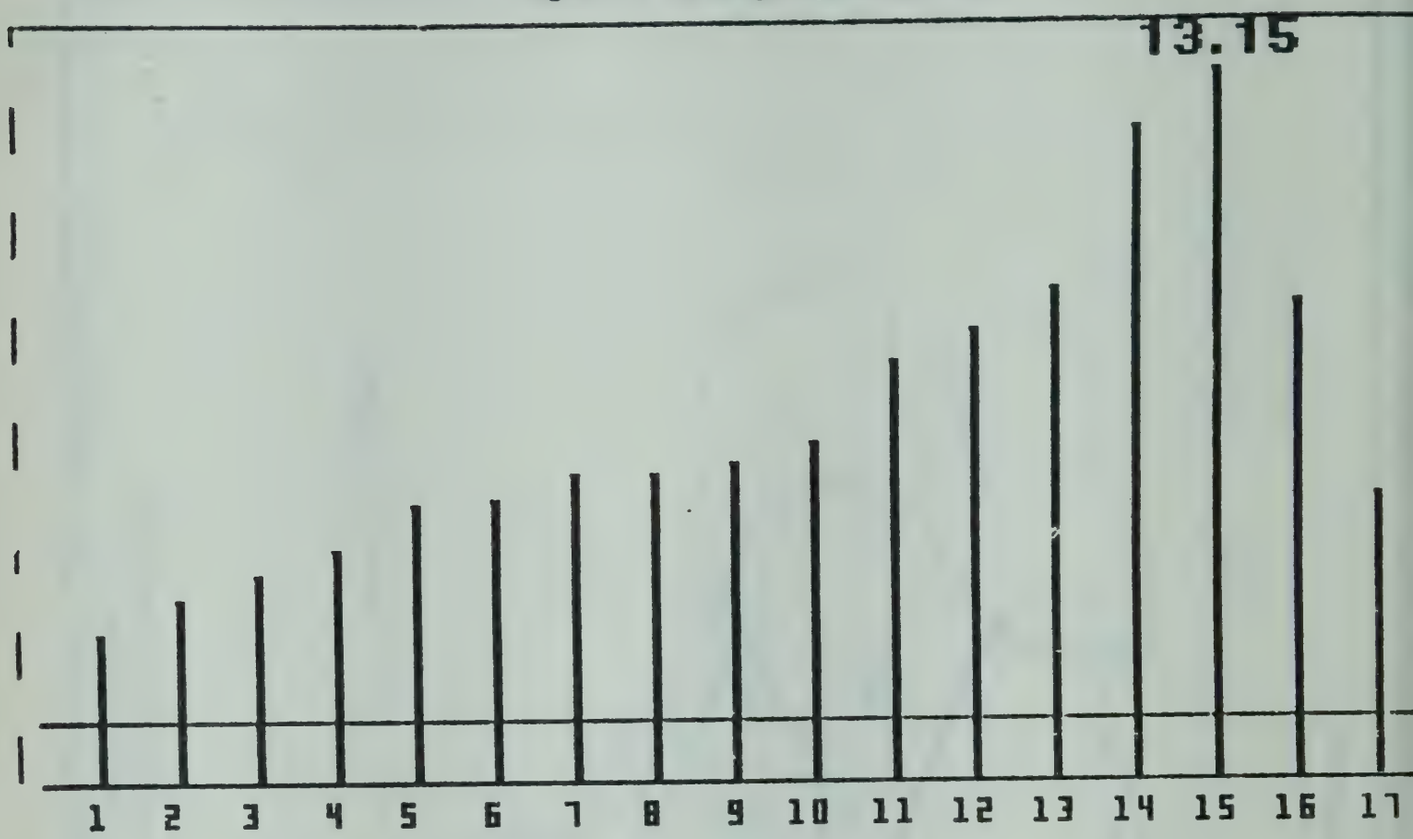


Figure 5.4: Map of Dediapada Taluka



Numbers refer to location code numbers of the Census (See Appendix 3.2)

Figure 5.5: The Inequality Index (INEX)



1. Umarzhar
2. Relwa
3. Karutha
4. Katkuva
5. Khokhraumar
6. Dadakui
7. Boridabara
8. Ambavadi
9. Nani Singloti
10. Kunbar
11. Umarkhadi
12. Kevdi
13. Gangapur
14. Gadi
15. Almavadi
16. Dediapada
17. Zhankhvav

Chapter 6

The Cooperatives as an Instrument of Social Change

6.1 Introduction

In Chapter five we identified 'Membership in the Cooperative' as one of the factors helping to evaluate the social impact of the cooperative on tribal villages. The chapter also concluded that there is a moderate to high level of inequality in the sample villages. The present chapter analyses membership in the cooperative and examines whether or not it exhibits any class-bias, that is, whether, in the selection of members, the cooperatives have attempted to alter the unequal distribution of economic power in the tribal villages.

Specifically we examine the following three issues:

(i) the attitude of tribals towards the cooperative as explained by the proportion and the class-character of tribals not joining the cooperatives and their reasons for not doing so;

(ii) the class-distribution of membership in the cooperative as illustrated by the difference,if any between the class-distribution of members within the cooperative and the class-distribution of the population in the villages;

(iii) the distributional patterns of buffalo ownership and productivity measured by the correlation between land ownership, buffalo ownership and buffalo productivity. This analysis can throw into relief whether the cooperative has really shown a bias in favour of the poor so as to decrease the degree of economic inequality.

6.2 The Attitude of the Tribals Towards the Cooperative

The attitude of the tribals to the cooperative can be ascertained by calculating the proportion of village households that have become its members and by examining the reasons given by those households that have not joined it. We take up these two issues in turn.

Table 6.1: Distribution of Membership

Villages	Total no. of village households	Total no. of member households	Percentage of membership
Dediapada Taluka	921	462	50.16
Ambavadi	41	28	68.29
Nani Singloti	71	50	70.42
Khokharaumar	119	70	58.82
Kunbar	85	45	52.92
Kevdi	123	62	50.41
Relwa	67	33	49.25
Gangapur	98	40	40.82
Almavadi	174	68	39.08
Gadi	72	24	33.33
Boridabara	71	42	59.15
Zhankhvav	796	629	79.02
Mangrol Taluka			
Umarkhadi	216	191	93.06
Umarjhar	221	143	64.71
Mandavi Taluka			
Katkuva	162	137	84.57
Karutha	101	82	81.19
Dadakui	96	76	79.17

From Table 6.1, it may be inferred that while a relatively large proportion of village households are members of the cooperative, this proportion varies from village to village. In Dediapada, the average membership is around 50 per cent. Four villages (Ambavadi, Nani Singloti, Khokhraumar and Boridabara) have cooperative membership of 60 per cent or more; in two villages, (Almavadi and Gadi), the membership is less than 40 per cent, and in the remaining four villages, the percentage of membership is around 50 per cent.

In sharp contrast, membership in the Zhankhvav villages is more widespread than in Dediapada: on an average, 75 per cent of all the households are cooperative members. Four of the villages from Zhankhvav have a membership of 80 per cent or more, while the remaining village (Umarjhar) has 65 per cent. More households from Mandavi taluka are represented in the cooperative than from Mangrol taluka.

Judging from the percentage of village households that have become members of the cooperative we can conclude that the acceptance of the co-operative has been half-hearted in Dediapada, and almost unanimous in Zhankhvav. We may also look at the problem of membership from the point of view of the NGDOs that started these cooperatives. The difference in the membership of village households observed between Dediapada and Zhankhvav cooperatives may possibly be attributed to the different policies adopted by the two NGDOs at the time of establishing these cooperatives. In Dediapada, the *extensive* approach was adopted, that is, more importance was given to the number of villages covered rather than to the number of households joining the cooperative in any one village in the hope that, later on, the remaining households would be enticed to become members. This hope has not been fulfilled because of the poor economic performance of the cooperative. In Zhankhvav, the *intensive* approach was adopted, that is, the aim was to attract as many households as possible from fewer villages. The economic success of the cooperative may have also helped in convincing reluctant households to join it.

In order to ascertain the reasons of the non-members for not joining the cooperative, a random sample of 84 non-members (53 in Dediapada and 31 in Zhankhvav) was taken. The questionnaire was open ended in the sense that it proposed no specific set of reasons. In order to simplify the analysis, the answers that were given have been summarised under five headings.

There is great variety in the reasons given by the respondents (Appendix 6.1). In general, lack of interest in the cooperative (4,i) was cited as the main reason by 33 per cent of those surveyed; refusal by the cooperative (1) was the reason cited by 22 per cent, and finally financial constraints (3) and legal impediments (5) were cited by 18 per cent and 19 per cent respectively.

Table 6.2: Reasons for Non-Membership

Number	Main Reason	Explanation
1	Refusal by the Co-operative	i) Buffaloes are not available ii) Individuals have occupations which are not compatible with buffalo-rearing iii) Individuals do not take care of the animals
2	Sale of milk outside the cooperative is better	
3	Financial Constraints	i) Subsidy is not available for large farmers ii) Inability to repay bank-loan; iii) Non-availability of loans for landless
4	Dairy farming is not viable	i) Individuals do not show interest ii) Owners of bonded labourers do not show interest so the latter cannot join iii) Individuals have other occupations and they do not consider dairy-farming profitable
5	Administrative/legal impediments	i) Members of another co-operative ii) Non-payment of money for shares iii) Lack of registration number iv) Below age-limit

In Dediapada, 30 per cent of those questioned had not become members because of the legal inabilities specified under (5); in their case, 'refusal by the cooperative' (1) is the least important reason for not joining it. It seems evident that at the time this cooperative was started, people were encouraged to join it, but many could not legally do so; this is especially true of Relwa where 70 per cent of those questioned specifically mentioned the *talati*'s refusal to provide the necessary documents. In prosperous villages like Almavadi, half of those interviewed were already members of another cooperative, and in Ambavadi 67 per cent gave 'financial constraints' (3) as the main reason. Only in Khokhraumar, the majority (60 Per cent) blamed the cooperative (1).

In Zhankhvav, though final acceptance was greater than in Dediapada, both the cooperative and the villagers showed a more critical attitude. In two villages, Umarkhadi and Umarjhar, all the respondents cited the 'coopera-

tive's refusal' (1) as the reason for not joining it; the refusal is to be interpreted in the light of the fact that buffaloes were no longer available through the government's subsidy scheme. In Karutha and Katkuva about half of those interviewed listed the 'non-viability of dairy farming' (4) as the most important reason.

Given the variety of reasons adduced and the fact that in many villages local considerations play an important role, it is difficult to generalise. All the same, it is an undeniable fact that there are many who show no interest in the cooperative and a fair proportion of these are landless. Many of them operate as 'bonded labour' and must obtain a tacit approval from their employers before they can become members. For obvious reasons, the employers have shown little interest in the cooperative, and their 'employees' have been forced to follow suit.

6.3 Class-distribution of Membership in the Cooperatives

In order to analyse the social role of the cooperative, it is necessary to see whether the class-distribution of members within the cooperative reproduces the class-distribution of the households within the village. If the class-composition of the cooperative reproduces proportionately the class-composition of households in the village, the cooperative merely reflects the class-structure of the village with all the existing inequalities. On the other hand, the cooperative may be said to have effected a radical change if, for example,

(i) the percentage of cooperative members belonging to the poorer section is higher than the proportion of this section in the total households of the village; or

(ii) all the people belonging to the poorer classes have become members of the cooperative, and some or many of the richer classes have not.

In the present study, the *Discrimination-Measure* (DM) is the tool used to analyse the social impact of the cooperative, and is defined as follows:

$$DM = I - II$$

where, I = percentage of total households in a village belonging to a particular class/group.

II = percentage of total cooperative member-households in a village belonging to the same class/group.

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If I > II, then DM > 0 and this implies that membership in the cooperative discriminates against this class/group because they are less than proportionately represented in the cooperative. If I = II, then DM = 0 and there is equal proportional representation. If I < II, then DM < 0 and the group/class under consideration has more than proportional representation in the cooperative or can be said to have been favoured. In Gadi, for example, the percentage of class A households to total households in the village is 83, while the percentage of cooperative member households belonging to class A is 67. The DM is positive and equal to 16, indicating that households belonging to class A are not proportionately represented in the cooperative and to that extent have been discriminated against.

Figure 6.1 depicts the DM calculated for class A with the help of data presented in Appendix 6.2. The DM curve is formed by joining together the DM values of class A for each village. The distance from the DM curve to the horizontal axis measures the extent of discrimination. If the DM curve lies above the horizontal axis, the discrimination is negative, that is, the poorest people are proportionately less represented in the cooperative. If the DM curve lies below the horizontal axis, the discrimination is positive, that is, the poor people are proportionately more represented in the cooperative, and hence they have been favoured.

People belonging to class A (the poor) are generally less represented, especially in five out of the fifteen sample villages. Note also that the area under the DM curve lying above the horizontal axis is greater than the area under the DM curve below it. On the whole, therefore, class A (the poor) have been more often discriminated against than favoured. This trend is more visible in the villages of Dediapada. In Zhankhvav, on the contrary, three villages (Dadakui, Kathkuva and Karutha) show a positive discrimination in favour of the poor. Kunbar (Dediapada) and Umarjhar (Zhankhvav) represent two extreme and atypical cases. In Kunbar, the poorer sections have been favoured (an exception in Dediapada), while in Umarjhar the economically more prosperous groups have obtained a much greater than proportional representation (an exception in Zhankhvav). The case of Umarjhar is puzzling: it has the lowest inequality index among all the sample villages and the highest index of discrimination against the poor. We may conclude from this that in this village where the levels of equality were reasonably high from the start the cooperative has, in fact, played a negative role by discriminating against the poor. Gadi seems to follow a different pattern: it has a very high inequality index and also exhibits the highest DM value. We may add that the

rank correlation between INEX and DM is close to zero, that is, the level of inequality, on the whole, is not an indication of the degree of discrimination. There seems to be, however, a relationship between the level of development and the DM index; Boridabara, Relwa, Gangapur and Gadi are villages at a relatively low level of development (Section 5.4.1) exhibiting a high index of discrimination against the poor.

We may conclude by saying that membership in the cooperative has not been used as an instrument to alter the economic inequalities existing in the villages. In Dediapada, the situation is worse: the poorer sections are proportionately less represented in the cooperative than the more prosperous groups, and this discrimination against the poor is markedly noticeable in the less developed villages.

In order to arrive at more specific conclusions regarding class discrimination, the DM analysis has been applied to the five classes or groups distinguished in this study: landless labourers, marginal, small, medium and large farmers. The DM values obtained for the fifteen villages over the five classes are presented in Appendix 6.3.

It has already been established that class A has been discriminated against. An analysis to ascertain which of the three groups (landless labourers, marginal and small farmers) belonging to class A bears the major brunt of this discrimination indicates that landless labourers have been the most affected group. In Dediapada cooperative, only Kunbar shows a positive bias in favour of landless labourers, while in Nanisingloti and Khokhraumar there is no sign of bias (the value of DM is close to zero). We may also note that in six villages the bias against landless labourers is very strong.

In Zhankhvav, the situation is quite different: in three out of the five sampled villages the landless labourers have been favoured, in one village there is no bias, and in Umarjhar there is a bias against the landless.

As regards marginal farmers, there is generally a positive bias in their favour. In Dediapada, seven villages show a negative value for their DM; this means that there has been a positive bias in favour of marginal farmers. The negative bias recorded for the remaining three villages is relatively small.

The most striking feature is that small farmers have been favoured in all the villages of Dediapada. We may therefore conclude that in Dediapada, membership has favoured small farmers; to some extent, marginal farmers;

and that landless labourers have not become members of the cooperative in proportion to their numerical strength in the villages.

In Zhankhvav, marginal farmers have been discriminated against in only one (Dadakui) village, while there is a negative bias against small farmers only in Umarkhadi. In the other four villages, marginal and small farmers tend to be favoured.

In Dediapada, medium and large farmers have been generally favoured though it is difficult to say which of the two groups shows a greater positive bias: in eight out of ten villages medium farmers, while in seven villages large farmers have been favoured. Kunbar is the exception: medium and large farmers have been discriminated against, especially the former, and this phenomenon must be related to the strong positive bias in favour of landless labourers. Three villages in Zhankhvav show a positive bias in favour of medium and large farmers, but it is not possible to conclude which of the two has been most favoured.

6.4 Relationship between the Class Distribution of Land, Buffaloes and Productivity

This section analyses the social impact of dairy cooperatives through an analysis of the distributional patterns of buffalo ownership and productivity. At the village level, the ratio of the total EOL owned/controlled by the cooperative members of a particular class, to the number of members in that class (N) is termed the "*Land per Class Member*" (LCM). This ratio defines the amount of land owned by an average representative of a particular class.

$$LCM = \frac{\text{Total EOL (acres) of cooperative members in a particular class}}{N}$$

"Buffalo-Ownership" (BO) is defined as the average number of buffaloes owned by an average member of a particular class.

$$BO = \frac{\text{Total number of buffaloes owned by members of a particular class}}{N}$$

"Buffalo-Productivity" (BP) is defined as the ratio of the total quantity of milk produced by all the in-milk buffaloes possessed by the members of a particular class, to the total number of in-milk buffaloes, during a given year.

$$BP = \frac{\text{Total milk quantity produced by in-milk buffaloes owned by a particular class}}{\text{Total number of in-milk buffaloes owned by a class}}$$

A simple correlation coefficient is used to analyse the relationship between LCM, BO, and BP. Two sets of correlation coefficients have been estimated:

(i) The correlation between LCM and BO [r(LCM,BO)]

If the value of *r* is close to 1, then there is a positive correlation between LCM and BO, that is, as we move from a representative (average) member from the group of landless labourer to a representative (average) member of the richer classes, their average buffalo ownership also increases; in other words, buffalo ownership follows the unequal distribution of land among households.

(ii) The correlation between LCM and BP [r(LCM,BP)]

A value of *r* close to 1 indicates a positive correlation between LCM and BP, while a value of r close to -1 implies a negative correlation between the two variables. Such a negative correlation would show that buffalo productivity increases as landownership falls; that is, as we move from a representative (average) member of the group of landless labourers to a representative (average) member of a richer class, the average productivity of their buffaloes falls.

6.4.2 Relationship between LCM and BO

Table 6.3 presents the values of r (LCM, BO) for all the villages during 1985-86. The value of *r* is high and positive for six of the 13 villages. For two villages it is positive and low; for three villages it is negative and low, and for two villages it is negative and significant. We may therefore conclude

that buffalo ownership follows the unequal distribution of land only in six villages, while only in two villages is this pattern reversed, that is, buffaloes are more equally distributed than land. These results do not allow us to arrive at a firm general conclusion. What seems to emerge is that, in general, the distribution of buffaloes among the various classes tends to be more equal than the distribution of land.

Table 6.4 which presents the r(LCM,BP) for all the villages during 1984-85 and 1985-86 shows that there is a negative correlation between these two variables: in ten villages the correlation coefficient is negative, though only in six of these villages is it significant. This means that buffalo productivity among the poorer classes is higher than among the richer class.

A note of caution may be sounded here regarding a simplistic interpretation of the results presented in Table 6.4. There is a lack of consistency between the value of *r* for a single village in successive years: only five

Table 6.3: Correlation Coefficients between Land per Class Member (LCM) and Buffalo-Ownership (BO)

Degree of Correlation	Name of Village	Value of r(LCM,BO)
High +ve 0.60 < 4 r < 1	Dadakui	0.99
	Gangapur	0.95
	Umarkhadi	0.95
	Khokhraumar	0.80
	Nani Singloti	0.79
	Kevd.	0.72
Moderate +ve 0.40 < r 0.60	-	
Low +ve 0.0 < r < 0.40	Ambavadi	0.37
	Kunbar	0.27
Low -ve	Relwa	-0.33
	Umarjhar	-0.25
	Boridabara	-0.07
Moderate -ve	Almavadi	-0.51
High -ve -0.60 > r	Karutha	-0.93

Table 6.4 Correlation Coefficients between Land per Class Member (LCM) and Buffalo-Productivity (BP)

	1984-85		1985-86	
Degree of Correlation	**Name of Village**	**Value of r**	**Name of Village**	**Value of r**
High -ve r = -0.60 to -1.00	Umarkhadi	-0.94	Umarkhadi	-0.78
	Kunbar	-0.92	Khokhraumar	0.88
	Dadakui	-0.87	Kevdi	-0.64
	Almavadi	-0.86	Karutha	-0.68
	Kevdi	-0.86		
Moderate -ve T = -0.40 to -0.60	Umarjhar	-0.43	Ambavadi	-0.48
	Ambavadi	-0.49	Naui Singloti	-0.51
Low -ve r = 0 to -0.40	Relwa	-0.32	Dadakui	-0.31
	Khokhraumar	-0.31	Relwa	-0.29
	Naui Singloti	-0.29	Almavadi	-0.21
Low +ve r = 0 to +0.40	Karutha	0.23	Kunbar	0.25
Moderate +ve r = 0.40 to 0.60	Gangapur	0.47	Umarjhar	0.62
High +ve r = 0.60 to 1.00	Boridabara	0.77	Boridabara	0.90

villages show a consistent value. For the rest, the variability is great; in three villages, the absolute value of *r* drops; in another two villages it shows an increase; and there are four villages where even the sign of *r* changes from year to year.[1] The wide fluctuations of *r* from year to year may indicate that buffalo productivity among the poorer groups is greatly affected by changes in agricultural output and by other factors. Though in a single year the majority of villages shows a negative relationship between LCM and BP, this relationship may not hold in a time-series analysis of a particular village.

6.5 Conclusion

The picture that emerges from this analysis cannot be very comforting for those who believe that OF through cooperatives of the Anand pattern

1. In Karutha, for example, the value of r changes from 0.23 to -0.68, in Gangapur from 0.47 to -0.55, in Umarjhar from -0.43 to 0.62, and finally, in Kunbar from -0.92 to 0.25.

benefits the poorest in the village, for it has been seen that many landless labourers do not, and cannot, become members of these cooperatives. On the whole, membership in a cooperative cannot be used as an instrument to foster more economic equality. It is, therefore, unrealistic to expect dairy cooperatives to play a positive social role by favouring membership among the poorest in the village. Many economic factors, especially the non-availability of fodder, militate against them. It is possible to speak of a positive social impact on the small farmers inasmuch as the response from them has been better. If dairy farming helps in protecting their small holdings, and thereby prevents them from joining the ranks of the landless–and this is a big if–then the process of marginalisation may be stopped.

We must also question the type of supportive intervention provided by the NGDOs to dairy farming. The analysis shows that Dediapada's *extensive approach* of covering more villages has led to discrimination against the landless, keeping 50 per cent of the village households away from the cooperative. Zhankhvav's *intensive approach* of covering more households (in fewer villages) has succeeded in achieving more equal representation from all groups. Given the particular economic factors operating in a dairy project, the role of the NGDO must be to ensure that at least an equal representation from all sections is achieved. It appears that this is possible only when the efforts of the NGDOs are concentrated rather than dispersed over a large number of villages.

APPENDIX 6.1
PERCENTAGE OF RESPONDENTS CITING EACH REASON

Village		1	2	3	4	5
Khokhraumar	(8)	62.50 (5)	–	–	37.50 (3)	–
Kunbar	(11)	–	–	27.27 (3)	63.64 (7)	9.09 (1)
Almavadi	(11)	–	27.27 (3)	18.18 (2)	–	54.55 (6)
Kevdi	(10)	–	10.00 (1)	20.00 (2)	60.00 (6)	10.00 (1)
Ambavadi	(3)	–	–	66.67 (2)	–	33.33 (1)
Relwa	(10)	–	–	20.00 (2)	10.00 (1)	70.00 (7)
Dediapada	(53)	9.43 (5)	7.55 (4)	20.76 (11)	32.08 (17)	30.19 (16)
Umarjhar	(8)	100.00 (8)	–	–	–	–
Dadakui	(3)	100.00 (3)	–	–	–	–
Katkuva	(10)	10.00 (1)	30.00 (3)	10.00 (1)	50.00 (5)	–
Karutha	(10)	–	10.00 (1)	30.00 (3)	60.00 (6)	–
Zhankhvav	(31)	38.71 (12)	12.90 (4)	12.90 (4)	35.48 (11)	–
TOTAL	(84)	20.24 (17)	9.52 (8)	17.86 (15)	33.33 (28)	19.05 (16)

Note: - Non-members were not interviewed in Gadi, Nani SinglotiGangapur and Boridabara.

- Figures in brackets indicate total number of respondents.

APPENDIX 6.2
DISTRIBUTION OF DM FOR CLASS A AND B

Village	Class A			Class B		
	I	II	DM (I-II)	I	II	DM (I-II)
Dediapada Taluka						
Nani Singloti	59.15	58.00	1.15	40.85	42.00	-1.15
Ambavadi	92.69	89.30	3.39	7.31	10.70	-3.39
Boridabara	66.20	52.32	13.88	33.80	47.68	-13.88
Khokhraumar	84.03	82.84	1.19	15.97	17.16	-1.19
Kunbar	68.33	88.88	-20.55	31.77	11.12	20.65
Kevdi	88.62	87.10	1.52	11.38	12.90	-1.52
Relva	83.58	72.71	10.87	16.42	27.29	-10.87
Gangapur	81.44	72.50	8.94	18.56	27.50	-8.94
Almavadi	81.03	79.39	1.64	18.97	0.61	-1.64
Gadi	83.33	66.70	16.63	16.67	33.30	-16.63
Zhankhvav						
Umarkhadi	93.52	92.70	0.82	6.80	7.38	-0.82
Katkuva	91.98	93.49	-1.51	8.02	6.51	1.51
Karutha	68.32	69.53	-1.21	31.68	30.47	1.21
Dadakui	91.67	93.41	-1.74	8.33	6.59	1.74
Umarjhar	28.05	11.90	16.15	71.95	88.10	-16.15

Class A : Landless labourers, Marginal & Small Farmers

Class B : Medium and Large Farmers

DM : Discrimination Measure (I minus II)

I : Per cent of households belonging to a particular class within the total village population.

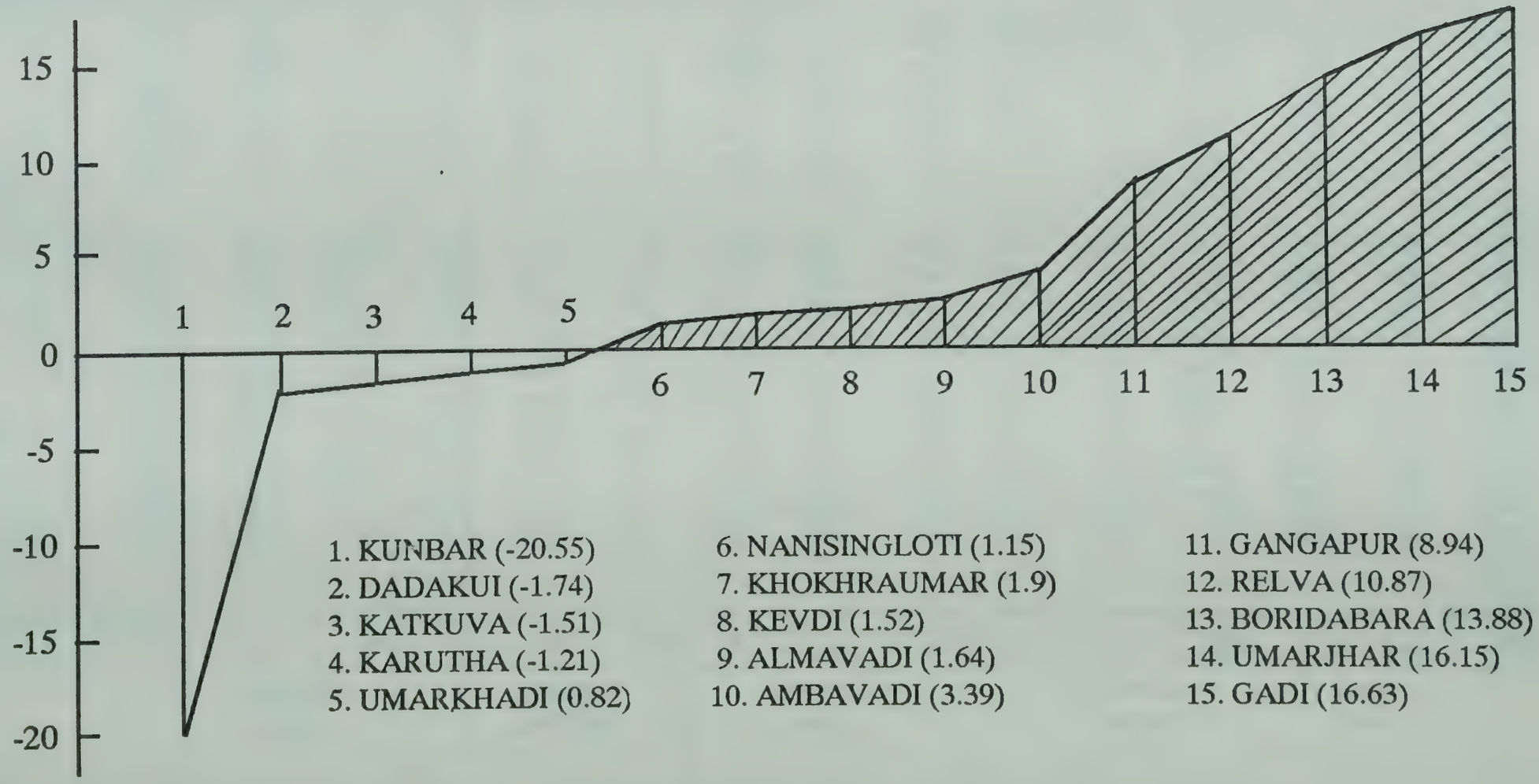
II : Per cent of these households within the total membership of the cooperative.

APPENDIX 6.3
DISTRIBUTION OF DM

	Landless Labourers			Marginal Farmers			Small Farmers			Medium Farmers			Large Farmers		
	I	II	DM	I	II	DM	I	II	DM	I	I	DM	I	II	DM
Dedipada Taluka															
Naini Singloti	16.9	12.0	4.9	18.3	16.0	2.3	23.94	30.0	-6.06	23.9	26.0	-2.1	16.90	16.0	0.9
Ambavadi	29.3	3.6	25.7	31.7	46.4	-14.7	31.71	39.3	-7.59	2.4	3.6	-1.2	4.9	7.1	-2.2
Boridabara	29.6	2.4	27.2	8.5	14.3	-5.8	28.17	35.7	-7.53	22.5	33.3	-10.8	22.3	14.3	-3.0
Khokrumar	37.0	37.1	-0.1	16.8	10.0	6.8	30.25	35.7	-5.45	12.6	15.7	-3.1	3.4	1.4	2.0
Kumbar	30.6	35.6	-5.6	11.8	22.2	-10.4	25.88	31.1	-5.22	23.5	6.7	16.8	8.2	4.4	3.8
Kevdi	59.4	46.8	12.6	13.0	19.4	-6.4	16.26	21.0	-4.71	10.6	11.3	-0.7	0.8	1.6	-0.8
Relwa	7.5	12.1	-4.6	26.9	9.1	17.8	49.25	51.5	-2.25	13.4	21.2	-7.8	2.9	6.1	-3.2
Gangapur	56.7	25.0	31.7	7.2	17.5	-10.3	17.53	30.0	-12.47	13.4	20.0	-6.6	5.2	7.5	-2.3
Almavadi	60.3	48.5	11.8	8.1	11.8	-3.7	12.64	19.1	-6.46	12.1	11.8	0.3	6.9	8.8	-1.9
Gadi	65.3	41.7	23.6	2.8	0.0	2.8	15.28	25.0	-9.72	11.1	20.8	-9.7	5.6	12.5	-6.9
Zhankhvav															
Umarkhandi	59.5	59.7	0.0	10.2	11.5	-1.3	18.48	21.5	-1.57	6.0	6.8	-0.8	0.5	6.5	-6.0
Katkuva	27.8	29.2	-1.4	37.7	36.5	1.2	26.54	27.7	-1.26	6.2	5.1	1.1	1.9	1.5	0.4
Karutha	20.8	17.1	3.7	12.9	15.9	-3.0	34.65	36.6	-1.95	27.7	25.6	2.1	4.0	4.9	0.9
Dadakui	27.1	27.6	--0.5	37.6	39.5	-1.9	27.08	26.3	0.78	7.3	5.3	2.0	1.0	1.3	-0.3
Umarzar	0.5	0.7	-0.2	4.6	2.1	2.5	23.08	9.1	13.98	38.9	41.3	-2.4	33.0	46.9	-13.9

I : % of households belonging to particular class within the total village population.
II : % of these households within the total membership of the cooperative

Figure 6.1: Discrimination Measure (DM) for Class A



1. KUNBAR (-20.55)
2. DADAKUI (-1.74)
3. KATKUVA (-1.51)
4. KARUTHA (-1.21)
5. UMARKHADI (0.82)
6. NANISINGLOTI (1.15)
7. KHOKHRAUMAR (1.9)
8. KEVDI (1.52)
9. ALMAVADI (1.64)
10. AMBAVADI (3.39)
11. GANGAPUR (8.94)
12. RELVA (10.87)
13. BORIDABARA (13.88)
14. UMARJHAR (16.15)
15. GADI (16.63)

Chapter 7

Distributional Patterns of Income and Cash Benefits

7.1 Introduction

One of the most important facilities provided by SUMUL to all the primary cooperative societies is a permanent, year-round milk-collection system. Remote villages are thus assured that, whatever the quantity of milk produced during the year, it will be bought at a reasonable price. The introduction of dairy farming in these tribal areas has resulted in a steady flow of income--always paid in cash--to the milk producers. At the same time, the incentive to increase household income through buffalo-rearing has induced many tribals to use child labour for grazing the animals. The fact that this may have a negative impact on the education of children is a factor to be taken into serious consideration.

This chapter examines, *first*, the relative significance of the income obtained from the sale of milk for the tribal households; and *second*, the negative impact of dairy farming on the education of children. Since this part of the study deals with the social impact of dairy farming on tribal society, the analysis undertaken in this chapter focuses on the *class distribution* of the benefits obtained from the sale of milk as well as on the class and *gender incidence* of child labour. The chapter also studies the problem and the class distribution of *zero-income*, that is, the extent and the class distribution of tribals who do not sell any milk.

7.2 Methodology

We start by *defining* the variables and indicators used in this chapter.

Milk Income (MI) is the total value of the

– milk sold to SUMUL (X_1)

– milk privately traded (X_2)

– milk products like ghee sold or consumed (X_3)

– cow's milk sold (X_4)

– self consumed milk (X_5)

In short,

$$\text{Milk Income (MI)} = \sum_{i=1}^{5} X_i$$

Note that

(i) the value of X_i has been calculated by using an average or standard price for each village/cooperative;

(ii) data on the quantity of self-consumed milk was obtained on a monthly basis and then multiplied by 12 to obtain an annual figure;

(iii) the values of X_i have been computed for one year.

Milk Cash (MC) is the income earned by the tribal household through the sale of milk and other milk products. The difference between MI and MC is that the latter does not contain the value of self-consumed milk.

$$\text{Milk Cash (MC)} = \sum_{i=1}^{4} X_i$$

The term '*zero-milk income*' describes the condition of those cooperative members who do not receive any income from the sale of milk because their animals are dry or have died during the year under consideration.

Two *indicators*, R_1 and R_2, are used to measure the relative significance of MI and MC in the total income and cash received by the members. They are defined as follows:

$$R_1 = \frac{\sum_{i=1}^{5} X_i}{\sum_{i=1}^{5} X_i + \sum_{i=1}^{4} A_i}$$

where, the X_i's are defined as before and

A_1 = Value of agricultural output
A_2 = Total income obtained from agricultural labour
A_3 = Total income obtained from other non-agricultural labour, for example, labour used by the forest department.
A_4 = Total income obtained from other sources, for example the sale of wood.

Note that the total income of a member is made up of two components: MI and income from other sources expressed by the second term in the denominator. Indicator R_1 measures the proportion of MI to the total income of a cooperative member in a year.

Assuming no change in the value of the agricultural output from one year to another and keeping other sources of income constant, an increase in MI will raise R_1. On the other hand, even if MI does not change, R_1 will decline if the value of agricultural output rises.

$$R_2 = \frac{\sum_{i=1}^{4} X_i}{\sum_{i=1}^{4} X_i + \sum_{i=1}^{5} A_i}$$

where, the X_i's are defined as in 7.2.1 and

A_5 = the value of marketed agricultural surplus.

R_2 measures the proportion of cash (MC) obtained from the sale of milk to the total cash received by a cooperative member in a year. The differences between R_1 and R_2 are as follows:

(i) The numerator of R_2 does not include self-consumed milk (X_5); this component is also absent in the first part of the denominator. As we mentioned before, no cash is obtained from the consumption by the member of the milk produced.

(ii) In the denominator, A_1 has been omitted and A_5 has been added. The reason for this change is that most tribals obtain cash only from the sale of agricultural surplus; once A_5 is introduced, A_1 must be removed to avoid double counting.

Changes in R_2 may be due to changes in MC and in the value of the marketed surplus. Assuming the latter to remain constant, a rise in MC will also raise R_2, while the same effect will occur if the value of the marketed surplus falls when MC remains constant.

A comparative analysis of the relative significance of MI and MC for various classes and cooperatives is done with the help of the *average method*. According to this, values of R_1 and R_2 for each member are averaged over the whole village/class/ cooperative to obtain a representative value for each of the above groups.

7.3 Relative Importance of MI and MC

Values of R_1 and R_2 obtained for the 13 villages during the years 1984-85, and 1985-86 are presented in Appendix 7.1. For a Dediapada member, the share of milk income in his total income remains unchanged at around 33 per cent during both years. In Zhankhvav, the share of milk income in total income rises from 47 per cent in 1984-85 to 55 per cent in 1985-86. This difference between the two cooperatives is significant: a better economic performance, as in the case of Zhankhvav, results in the rise of the share of milk income in total income.

A village-wise analysis shows that in 1984-85, for seven out of a total of 13 villages, the percentage of total income obtained from the sale of milk was between 25 and 35. For the remaining six villages the percentage was between 35 and 60. In 1985-86, the proportion of total income obtained from the sale of milk increases: the share of milk income in total income remained below 30 per cent only in three villages, and in seven villages the share increased over the percentage recorded in the previous year.

The fact that milk income constitutes at least one-third of the total income means that the introduction of dairy farming has increased the total income of a tribal household by this amount. There is no doubt that in a society where the level of economic development is very low and a great number of households live around the poverty line, this increase in income is crucial for their survival.

As expected, the share of milk cash in total cash is greater than the share of milk income in total income (Appendix 7.1). In Dediapada the value of R_2 rose from 39 per cent in 1984-85 to 42 per cent in 1985-86, while in Zhankhvav it rose from 62 per cent to 65 per cent. Dairy farming has increased the cash available with the members by about 50 per cent, and the relative share of milk cash in total cash increases as the economic performance of the cooperative improves.

A village-wise analysis of the distribution of R_2 over all the villages shows that in 1984-85, four villages had R_2 values between 25 per cent and 35 per cent, and another four had R_2 values above 50 per cent; in 1985-86 the number of villages with R_2 values between 25 per cent and 35 per cent was the same, but the number of villages with R_2 values above 50 per cent rose to six. It is very clear that there has been an overall increase in the proportion of MC to total income.

7.4 Class-Distribution of MI and MC Benefits

The Zhankhvav cooperative is an example of the positive role that dairy farming can play for the poorer classes: the share of MI in total income is greater for members belonging to class A than for members belonging to class B. In 1984-85 the values of R_1 for members belonging to class A and B were 58 per cent and 36 per cent respectively; in the following year,the R_1 values rose to 66 per cent and 43 per cent. Dairy farming has enabled the poorer members of the Zhankhvav cooperative to increase their total income very substantially. In 1984-85 the difference between the values of R_1 for classes A and B was much smaller in Dediapada than in Zhankhvav; and in 1985-86 this difference tended to disappear. It is a matter of some concern to note that dairy farming in Dediapada has not given the poor an income advantage over the rich.

The analysis of the share of MC in total cash follows a similar pattern: in 1984-85 and 1985-86, the share of MC in total cash for a member of the Zhankhvav cooperative belonging to class A was *two-thirds* of his total cash,

while this share was only *half* of his total cash for a member of the same cooperative belonging to class B. In Dediapada the values of R_2 for classes A and B are almost the same. Once again, it appears that in the matter of milk cash the poor have gained no distinct edge over the rich.

We turn now to analyse the distribution of R_1 and R_2 values over the five classes into which class A and class B have been broken down (Table 7.1, Fig. 7.1). The curves representing the distribution of R_1 over the five classes are negatively sloped; this indicates that the poorer classes have received relatively more benefits from MI than the more prosperous classes. The recurring fact that the difference in benefits between the landless and the large farmers is far greater in Zhankhvav than in Dediapada reinforces the conclusion that the benefits from MI have played a positive role in fostering more equality at the village level. In other words, if dairy farming can be undertaken by landless, marginal and small farmers, its impact on their income will be relatively more significant than the impact of dairy farming on the income of large farmers. The case of Zhankhvav depicted in Fig. 7.1 proves this point. The share of MI in total income is 70 per cent for a landless labourer, between 50 per cent and 60 per cent for marginal and small farmers and only 20 per cent for large farmers.

The same conclusion holds on the whole for the share of milk cash in total cash with some differences (Fig. 7.2). In Dediapada, the share of MC in total cash for landless, marginal and small farmers is about 40 per cent, while for large farmers it is slightly above 10 per cent. It is interesting to note that the share of MC for all the groups constituting class A is practically the same. The reason for this similarity may be sought in the very poor economic situation shared equally by all these three groups.

Table 7.1: Class Distribution R_1 and R_2

	R_1				R_2			
	1984-85		1985-86		1984-85		1985-86	
	D	Z	D	Z	D	Z	D	Z
Landless Labourers	.38	.69	.38	.71	.35	.75	.38	.80
Marginal Farmers	.32	.53	.33	.51	.36	.98	.40	.69
Small Farmers	.25	.46	.31	.59	.33	.64	.39	.69
Medium Farmers	.19	.41	.20	.50	.25	.59	.30	.64
Large Farmers	.14	.20	.11	.18	.24	.34	.17	.23

D = Dediapada
Z = Zhankhvav

During 1985-86, the share of MC in total cash increased for these three groups, but fell considerably for large farmers: from a distributional point of view, 1985-86 was a very good year for the poor. The distribution of R_2 in Zhankhvav highlights again the points made earlier regarding R_1. Extreme differences persist between the group of landless, marginal, small, and medium farmers on the one hand, and the group of large farmers on the other. Finally, the curves presented in Figures 7.1 and 7.2 indicate that, as regards the benefits received from MI and MC, there is a clear division between large farmers on the one hand and all the other four groups on the other.

7.5 The Problem of Zero-Milk-Income

The term zero-milk-income covers those members of a cooperative who, in the year under consideration, have not received any income or cash from milk because they have not produced any milk. In this section we analyse the extent of zero-milk-income in the cooperatives and its incidence among various classes.

The case of zero-income is widespread and on the rise (Table 7.2). On an average, 36 per cent of the cooperators received no income from milk in 1984-85; in the following year roughly half (53 per cent) of the total cooperators received no income from milk. A comparison between Dediapada and Zhankhvav shows that in the former the number of unproductive dairy farmers almost doubled; it rose from 35 per cent in 1984-85 to 59 per cent in 1985-86. In Zhankhvav the rise has been moderate: from 40 per cent to 44 per cent. This is clear proof that the economic aspect of buffalo rearing in Dediapada suffered a serious setback during 1985-86.

The same results appear when we consider each sample village independently. In 1984-85, six villages found more than one-third of all members without milk-income; in the following year the number of such villages rose to ten. Of these ten villages, seven had more than 50 per cent of their members with no milk-income. Both for 1984-85 and 1985-86 the worst affected villages are Kevdi (65 per cent and 80 per cent), Ambavadi (43 per cent and 89 per cent), Kunbar (44 per cent and 87 per cent), Boridábara (43 per cent and 64 per cent).

Both rich and poor have been affected by this problem, though the poorer classes have been worse hit. In 1984-85, 36 per cent of members belonging to class A, and 34 per cent of members from class B had no income

from milk. In the following year, the figures rose to 53 per cent and 49 per cent respectively. The growing incidence of zero-milk-income among Dediapada members is alarming: in one year, the percentage of class A members with no milk-income doubled, while the percentage of class B rose from 34 per cent to 52 per cent (Appendix 7.3).

Table 7.2: Incidence of Zero Milk Income

Village	% of members with zero milk income	
	1984-85	1985-86
Gadi	NA	NA
Nani Singloti	46.00	34.00
Khokhraumar	15.71	27.14
Gangapur	20.00	52.50
Kunbar	44.44	86.67
Almavadi	26.47	67.65
Kevdi	64.52	79.93
Ambavadi	42.86	89.29
Relwa	09.09	45.45
Boridabara	42.86	64.29
Dediapada	34.93	58.90
Umarkhadi	NA	NA
Umarjhar	0.00	0.00
Mangrol Taluka	0.00	0.00
Dadakui	18.42	26.32
Katkuva	54.74	46.72
Karutha	24.39	56.10
Mandavi Taluka	39.95	44.07
Zhankhvav	39.95	44.07
Total	35.74	52.93

At a more disaggregated level of class analysis we observe that in 1984-85, the worst affected were the landless (39 per cent), followed by large farmers (37 per cent), small farmers (36 per cent), and medium and marginal farmers (33 per cent). The rise in the percentage of members with zero milk-income during 1985-86 affected the landless in the most severe manner and the other classes somewhat equally.[1] As expected, in the villages of Dediapada the incidence among the landless increased by 33 percentage points (Appendix 7.4).[2]

7.6 Dairy Farming and its Impact on the Education of Children

In tribal and other less developed areas, dairy farming depends to a large extent on the labour input provided by children. Grazing of cattle in these areas is left to children of school-going age because adult members of the household have either to cultivate their meagre holdings, or hire out their labour services. The term '*child-labour*' refers to the labour time employed in grazing cattle by boys and girls between the ages of five and twelve.

In general, about one-third (32 per cent) of the children belonging to all the member-households surveyed go for cattle-grazing. This large percentage of children is thus kept away from school. Surprisingly, the percentage of children going for grazing is higher in Zhankhvav (40 per cent) than in Dediapada (24 per cent).[3]

The class-wise distribution of children going for cattle-grazing presented in Table 7.3 does not seem to exhibit any class-bias. The percentage of child-labour for both the rich (class B) and the poor (class A) is almost the same. It is slightly more frequent among the small farmers (34 per cent) and medium farmers (35 per cent).

In all the households surveyed there is no particular discrimination against girls: 31 per cent of all boys and 34 per cent of all girls go for cattle

1. The increase in the incidence of zero-milk-income for various classes measured in percentage points was as follows: landless, 24; medium farmers, 15; marginal farmers, 14; small and marginal farmers, 13.

2. In Ambavadi and Boridabara (Dediapada) none of the landless received any income from milk during the two years for which data exist. In the former village, medium and large farmers were in the same position. By contrast, the case of Umarjhar (Zhankhvav) is remarkable: there are no members with zero-milk-income at all.

3. Gangapur (Dediapada) with 50% and Umarkhadi (Zhankhvav) with 48% are villages with a very high proportion of child-labour.

grazing and hence do not attend school (Appendix 7.4). However, it is interesting to note that in villages where the percentage of child-labour is high,[4] the percentage of female child-labour is also very high. We can therefore conclude that when the need for child-labour exceeds a particular level, around 25 per cent to 30 per cent, the additional requirement of child-labour is most often met from the pool of available female child-labour. To this extent, female education seems to be more easily expendable than male education.

Table 7.3: Percentage of Children going for Cattle-grazing

Village	Boys	Girls	Children
Almavadi	14.75	14.63	14.71
Boridabara	17.39	23.33	19.74
Nani singloti	19.40	33.33	21.95
Kevdi	22.64	26.09	24.24
Karutha	23.44	44.74	31.37
Khokhraumar	23.53	47.83	29.67
Ambavadi	28.00	20.00	25.00
Dadakui	29.31	30.95	30.00
Relwa	30.00	30.77	30.23
Kunbar	32.65	47.37	36.77
Katkuva	36.63	38.10	37.20
Umarjhar	37.30	33.33	35.62
Umarkhadi	45.74	60.00	47.65
Gangapur	47.83	53.85	50.00
Dediapada	22.20	27.43	24.03
Zhankhvav			
Total	30.67	34.18	31.88

7.7 Conclusion

This chapter, more than any other, reveals the strength and weaknesses of dairy farming and the AHP. It also underlines the difficulty of making large generalisations either in favour of, or against, the introduction of dairy

4. For example Kunbar, Katkuva, Umarkhadi and Gangapur.

farming in tribal areas. If our conclusions do not satisfy the defenders and detractors of OF we can only appeal to the complex nature of reality.

We may start with the brighter side of the picture. The results of our analysis establish without any doubt that dairy farming has played a crucial role in increasing both the income and cash of the tribals. Given the low income levels prevailing in these villages, an increase in total income of 33 per cent (Dediapada) and 47 per cent (Zhankhvav), and a rise in total cash of 40 per cent (Dediapada) and 65 per cent (Zhankhvav) must be considered a significant achievement.

A heartening feature in the analysis of the distributional pattern of MI and MC is that, on the whole, the poorer classes have benefited more than the richer classes. This is particularly so in Zhankhvav: For members belonging to class A, the share of MI in their total income was almost double the share of MI in total income for members of class B; while the share of MC in total cash was two-thirds for a poor farmer and only half of his total cash for a rich farmer. Unfortunately, this positive effect on the poor is hardly visible among the members of the Dediapada cooperative. It is of interest that in the case of MI and MC there is clearly no discrimination against the poor in Dediapada, while in the case of other factors connected with dairy farming, discrimination against the poor in Dediapada is noticeable. The important point to be taken is that MI and MC have the highest equalising effects.

The disaggregated analysis of the distributional impact of MI and MC on the five classes strengthens the argument presented above. As regards both MI and MC, landless, marginal, small and medium farmers have benefited considerably more than large farmers. This is especially true in the case of Zhankhvav.

The share of MI in total income for the first four classes ranges approximately from 50 per cent to 70 per cent, while that of large farmers is only 20 per cent. The share of MC in total cash for the first four classes ranges from 60 per cent to 80 per cent, while that of large farmers is about 30 per cent. The fact that this distributional pattern is active in different degrees both in Zhankhvav and in Dediapada strongly supports the conclusion that:

(i) there is a clear economic gap between the first four classes on the one hand and the large farmers on the other;

(ii) there can be no doubt whatsoever that the introduction of dairy farming in tribal areas has, on the whole, benefited the poor more than the rich.

These conclusions emphasize the role that dairy farming can play not only in providing the tribals with a productive economic activity but in reducing existing inequalities, provided it becomes a feasible activity for landless and marginal farmers.

It is in this sense, however limited, that we firmly believe that dairy farming can and does help the poor. The tragedy is that OF and SUMUL have not geared dairy farming to fulfil this role inasmuch as no effective programme has been devised, much less implemented, to overcome severe limitations, such as the non-availability of fodder experienced by these poorer classes.

This failure, not of dairy-farming, but of the policy adopted, is poignantly visible in the problem of 'zero-milk-income'. An analysis of the 'zero-milk-income' (the situation of those members who received *no income* from milk because their animals were either dry or dead) shows that, in 1984-85, 36 per cent of all cooperators received no income from milk, and in the following year, this rose to 53 per cent. In Dediapada, the percentage of unproductive dairy-farmers was as high as 59.

More than anything else these facts reveal a tragic aspect of the dairy farming programme. It cuts down to painful size the conclusions arrived at above because they apply only to about half the tribal members. It is for this reason that we suggest that dairy farming has been, to some extent, a failure.

Figure 7.1: Distribution of R1

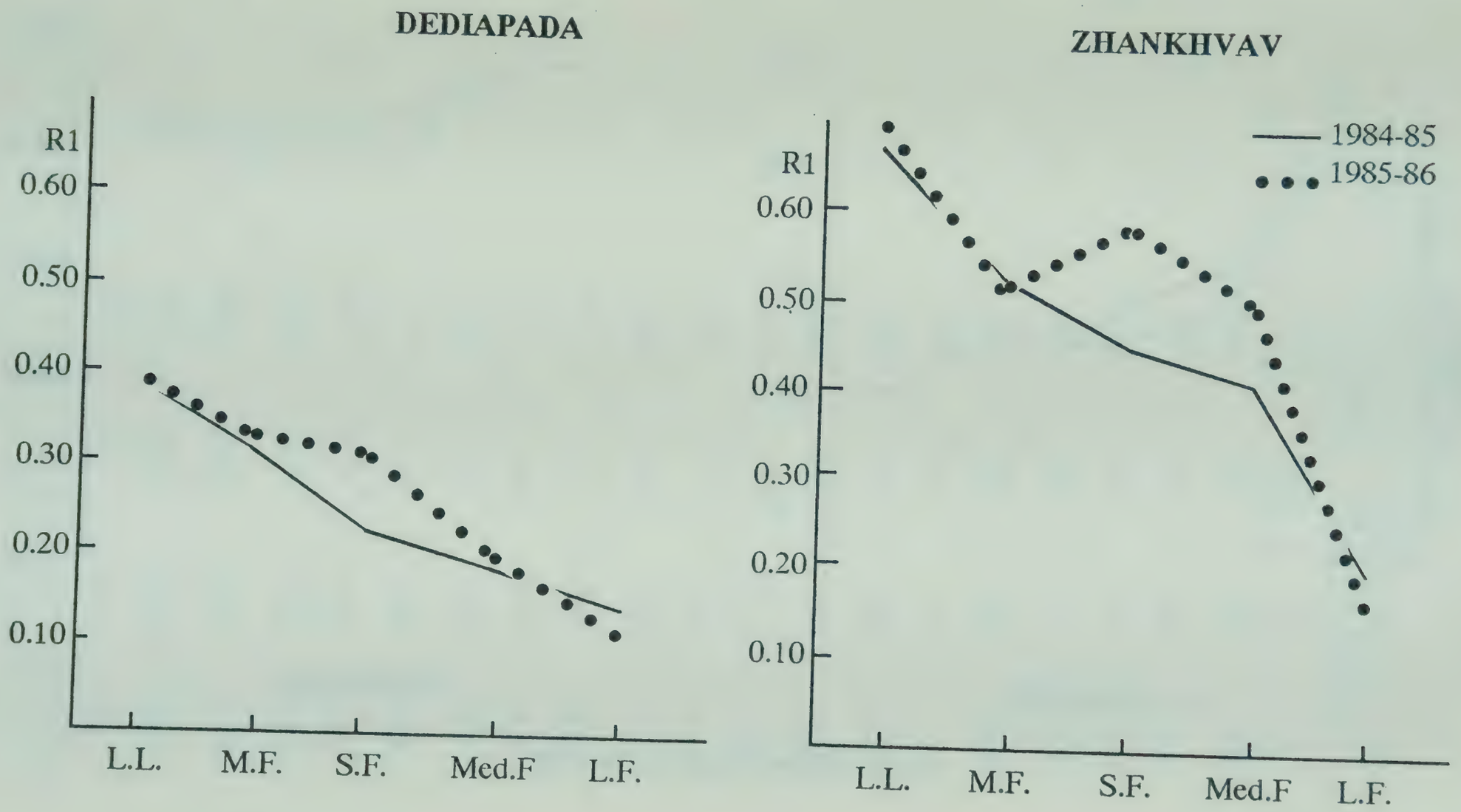
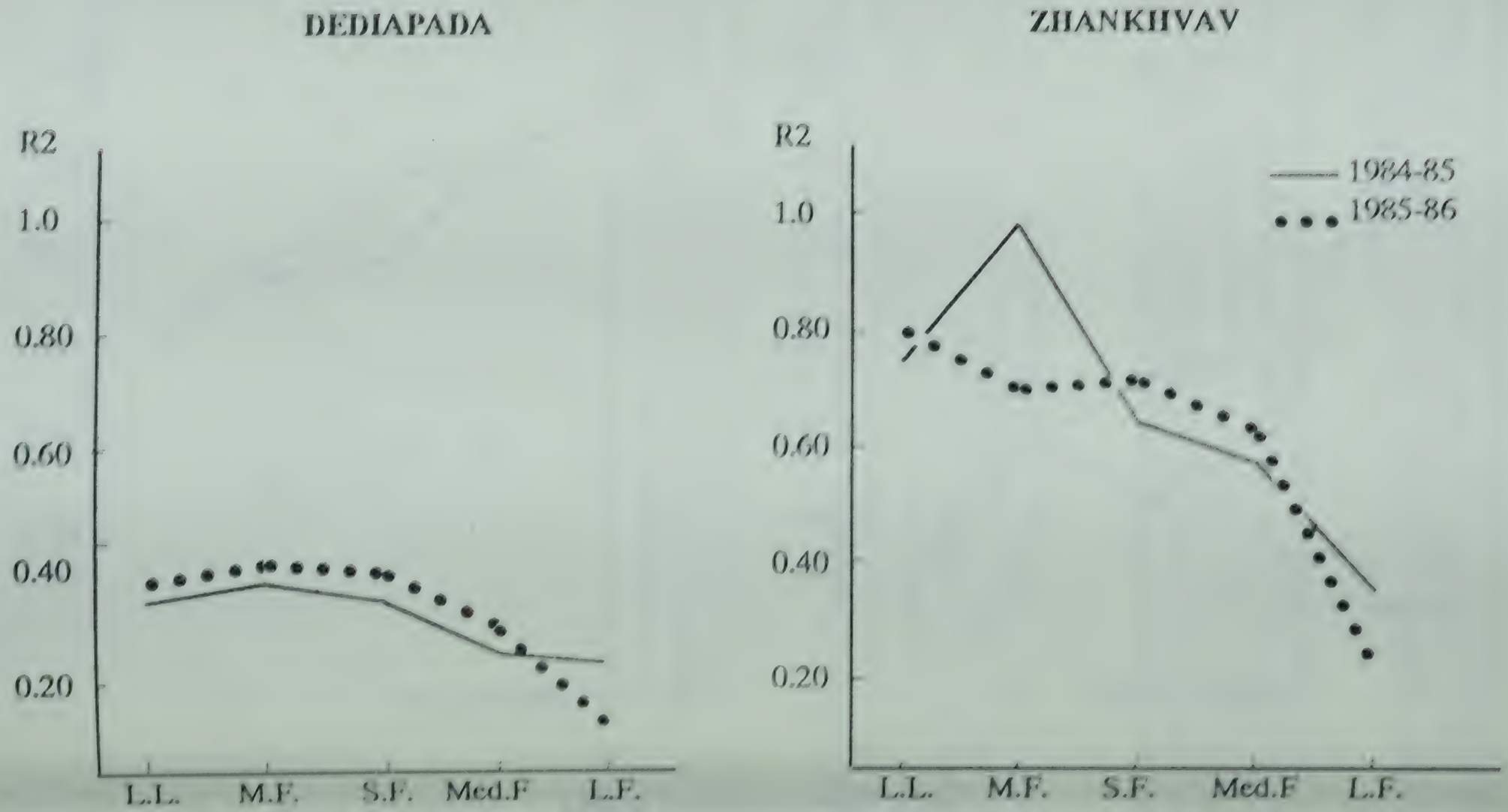


Figure 7.2: Distribution of R2



APPENDIX 7.1
MEAN VALUES OF R_1 AND R_2

Village	1984-85		1985-86	
	R_1	R_2	R_3	R_3
Gadi	N.A	N.A	N.A	N.A
Nani Singloti	0.23	0.30	0.39	0.49
Khokhraumar	0.48	0.57	0.40	0.58
Gangapur	0.23	0.27	0.25	0.31
Kunbar	0.46	0.41	0.29	0.29
Almavadi	0.30	0.30	0.24	0.22
Kevdi	0.27	0.20	0.38	0.37
Ambavadi	0.34	0.45	0.48	0.63
Relwa	0.24	0.43	0.18	0.28
Boridabara	0.26	0.31	0.35	0.41
Dediapada	0.33	0.39	0.33	0.42
Umarkhadi	N.A	N.A	N.A	N.A
Umarjhar	0.36	0.49	0.45	0.58
Mangrol Taluka	0.36	0.49	0.45	0.58
Dadakui	0.57	0.78	0.86	0.86
Katkuva	0.61	0.74	0.56	0.70
Karutha	0.51	0.66	0.38	0.52
Mandavi Taluka	0.56	0.73	0.63	0.72
Zhankhvav	0.47	0.62	0.55	0.65
Total	0.40	0.51	0.47	0.56

APPENDIX 7.2
CLASS-WISE (A/B) DISTRIBUTION OF MEAN VALUES OF R_1 AND R_2

Village	1984-85				1985-86			
	R_1		R_2		R_1		R_2	
	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B
Gadi	NA	NA	NA	NA	NA	NA	NA	NA
Nani: Singloti	0.24	0.23	0.29	0.32	0.49	0.29	0.59	0.38
Khokharumar	0.51	0.36	0.59	0.51	0.43	0.30	0.58	0.59
Gangapur	0.25	0.18	0.28	0.25	0.28	0.19	0.32	0.27
Kumbar	0.47	0.12	0.42	0.22	0.31	0.19	0.30	0.26
Almavadi	0.35	0.20	0.45	0.50	0.48	0.00	0.63	0.00
Relwa	0.28	0.15	0.45	0.38	0.22	0.04	0.33	0.14
Boridabara	0.27	0.25	0.32	0.31	0.37	0.33	0.34	0.48
Dediapada	0.36	0.23	0.39	0.39	0.37	0.25	0.43	0.39
Umarkhadi	NA	NA	NA	NA	NA	NA	NA	NA
Umarjhar	0.40	0.35	0.55	0.48	0.55	0.44	0.66	0.56
Mangrol Taluka	0.40	0.35	0.55	0.48	0.55	0.44	0.66	0.56
Dadakui	0.58	0.38	0.79	0.63	0.88	0.66	0.87	0.63
Katkuva	0.62	0.43	0.75	0.56	0.57	0.40	0.71	0.61
Karutha	0.57	0.38	0.70	0.58	0.45	0.27	0.57	0.43
Mandavi Taluka	0.59	0.39	0.75	0.59	0.67	0.39	0.75	0.51
Zankhvav	0.58	0.36	0.73	0.50	0.60	0.43	0.74	0.56
Total	0.45	0.32	0.54	0.46	0.51	0.39	0.60	0.52

APPENDIX 7.3
CLASS-WISE (A/B) INCIDENCE OF ZERO MILK INCOME

Village	Class A		Class B	
	1984-85	1985-86	1984-85	1985-86
Gadi	NA	NA	NA	NA
Nani Singloti	65.52	44.83	19.05	19.05
Lhokhraumar	17.24	29.31	8.33	16.67
Gangapur	17.24	48.28	27.27	63.64
Kunbar	42.50	87.50	60.00	80.00
Almavadi	24.07	66.67	35.71	71.43
Kevdi	59.26	77.78	100.00	87.50
Ambavadi	40.00	88.00	66.77	100.00
Relwa	12.50	45.83	0.00	44.44
Boridabara	40.91	50.00	45.00	65.00
Dediapada	38.51	60.00	33.98	52.43
Umarkhadi	NA	NA	NA	NA
Umarjhar	0.00	0.00	0.00	0.00
Mangrol Taluka	0.00	0.00	0.00	0.00
Dadakui	18.31	28.17	20.00	0.00
Katkuva	53.91	47.66	66.67	33.33
Karutha	24.56	59.65	24.00	48.00
Mandavi Taluka	37.50	44.92	33.33	38.46
Zhankhvav	37.50	44.92	33.33	38.46
Total	36.21	53.47	33.80	48.59

APPENDIX 7.4
CLASS-WISE INCIDENCE OF ZERO MILK INCOME

Village	Landless Farmers		Marginal Farmers		Small Farmers		Medium Farmers		Large Farmers	
	1984-85	1985-86	1984-85	1985-86	1984-85	1985-86	1984-85	1985-86	1984-85	1985-86
Gadi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nani Singloti	66.67	66.67	87.50	37.50	53.33	40.00	15.39	23.08	25.00	12.50
Khokharaumar	23.08	34.62	14.29	14.29	12.00	28.00	9.09	18.18	0.00	0.00
Gangapur	30.00	80.00	0.00	14.29	16.67	41.67	12.50	75.00	66.67	33.33
Kunbar	18.75	93.75	50.00	70.00	64.29	92.86	66.67	100.00	50.00	50.00
Almavadi	21.21	57.58	25.00	87.50	30.77	76.92	37.50	62.50	33.33	83.33
Kevdi	62.07	89.66	41.67	50.00	69.23	76.92	100.001	85.71	100.00	100.00
Ambavadi	100.00	100.00	38.46	36.36	90.91	100.00	100.00	100.00	50.00	100.00
Relwa	0.00	25.00	0.00	33.33	17.65	52.94	0.00	42.86	0.00	50.00
Boridabara	10.00	100.00	33.33	50.00	40.00	46.67	57.14	71.43	16.67	50.00
Dediapada Taluka	33.33	66.67	36.49	54.05	35.55	57.04	34.72	54.17	32.26	48.39
Umarkhadi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Umarjhar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mangrol Taluka	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dadakui	28.57	47.62	10.00	23.33	20.00	15.00	25.00	0.00	0.00	0.00
Katkuva	57.50	62.50	46.00	44.00	60.50	36.84	57.14	28.57	100.00	50.00
Karutha	50.00	64.29	15.39	69.23	16.67	53.33	19.05	42.86	50.00	75.00
Mandavi Taluka	48.00	58.67	30.11	40.86	36.36	37.50	28.13	34.38	57.14	57.14
Zhankhvav	48.00	58.67	30.11	40.86	36.36	37.50	28.13	34.38	57.14	57.14
Total	39.30	63.68	32.93	46.71	35.87	49.33	32.69	48.06	36.84	50.00

APPENDIX 7.5
CLASS-WISE DISTRIBUTION OF CHILDREN GOING FOR CATTLE-GRAZING

Class	Boys	Girls	Boys & Girls
1. Landless Labourers	26.37	34.23	29.35
2. Marginal Farmers	32.03	26.76	30.36
3. Small Farmers	32.00	38.64	34.15
4. Medium Farmers	35.23	35.79	35.42
5. Large Farmers	25.44	30.65	27.27
Class B	31.38	33.76	32.22

Chapter

Distributional Pattern in th
Utilisation of AHP Service

8.1 Introduction

The dairy cooperatives offer their members a variety of service
medical, managerial, and administrative. This chapter analyses two ba
issue–the extent to which the services are utilised in general by the coope
tives and, more specifically, the distributional pattern of the utilisation
these services among various classes. The question being raised by t
analysis undertaken in this chapter is this: does any one class have eas
access to these services (and the consequent improved productivity) th
any other?

The methodology used involves the selection of four variable
vaccination, treatment of sick animals, insemination, and the in-milk ra
All the four variables are defined as a rate. It must be noted here that t
fourth variable, the in-milk rate, captures the overall impact of the oth
three variables on the productivity of the animal. The four variables s
defined below and the term N stands for the total number of buffalo
including female calves.

$$\text{Vaccination rate} : U_1 = \frac{\text{Number of vaccinated buffaloes}}{N}$$

$$\text{Treatment rate} : U_2 = \frac{\text{Number of times buffaloes were treated}}{N}$$

$$\text{Insemination rate} : U_3 = \frac{\text{Number of buffaloes inseminated}}{N}$$

$$\text{In-milk rate : } U_4 = \frac{\text{Number of buffaloes in milk}}{N}$$

Since the variables are defined for a given year, each one will be equal to a particular number or index. On the basis of the four indices a Composite Utilisation Index (CUI) has been constructed. Different weights have been assigned to each of the above four indices in order to estimate the CUI. Differences in weights reflect the relative importance of each variable in affecting the productivity of the animal.

Let the weights of U_1, U_2, U_3, and U_4 be

$W_1 = 0.25$

$W_2 = 0.20$

$W_3 = 0.15$

$W_4 = 0.40$

then, the CUI is the weighted average of the four indices defined above.

$$CUI = \frac{\sum_{i=1}^{4} Ui\ Wi}{4} \times 1000$$

The multiplicative factor of 1,000 is used to enlarge the index sufficiently so that comparisons are made easier. For the purpose of ranking villages and classes on the basis of their level of service utilisation, the values of CUI have been classified in the following categories expressing a descending degree of service utilisation.

Very High	:	CUI > 250
High	:	200 < CUI < 250
Moderate	:	150 < CUI < 200
Low	:	100 < CUI < 150
Very Low	:	CUI < 100

The assumption that values of CUI greater than 250 correspond to a very high degree of service utilisation is based on the estimation of reasonable upper limits for the values of the U_i ratios. In order for CUI to be equal to 250,

(i) the vaccination rate (U_1) should be equal to 2, implying that all the buffaloes are vaccinated at least twice a year; this seems to have been achieved, on an average, only in 1984-85 (Table 4.17);

(ii) the treatment rate (U_2) should be equal to 1.5 indicating that all the buffaloes have been treated at least once a year, and half the herd twice; the number of treated animals reported by the TVWs seems to be lower than this chosen value;

(iii) the insemination rate (U_3), as defined in this chapter, should be equal to 0.30; since the value of the breeding rate has been around 0.30 (Table 4.18) and the breeding rate has been defined as the ratio of inseminated to non-pregnant buffaloes, the rate U_3 which is defined as the number of inseminated divided by the *total* number of buffaloes will always be lower than 0.30;

(iv) the in-milk ratio (U_4) should be equal to 0.50; the values of the rate for Dediapada and Zhankhvav cooperatives have never reached 0.50, and hence it is reasonable to assume that 0.50 represents a very high value.

8.2 General Level of Service Utilisation

The CUI for all cooperatives shows a marked tendency to increase from year to year (Appendix 8.1 and Figure 8.1). The year 1984-85 witnessed a very high level of service utilisation; the entire curve lies within a lower bound of 200 and an upper bound of 250. The degree of utilisation during 1983-84 and 1985-86 remains moderate. We may also note that the villages of the Zhankhvav cooperative have utilised these services more than the villages of Dediapada. For all the three years the CUI of Zhankhvav has been consistently higher than the CUI of Dediapada.

We may therefore conclude that the degree of service utilization has, on the whole, been moderate. The fact that during one year there was an across the board rise in utilisation indicates that the services provided by the TVWs have remained partially unutilised for the other two years. The

better economic performance of the Zhankhvav cooperatives can be attributed to a greater utilisation of the services provided. We may reasonably establish a direct relationship between the high productivity levels achieved by the Zhankhvav cooperatives and the services rendered by the TVWs.

8.3 Class-bias in the Utilisation of Services

This section analyses the distributional pattern of the utilisation of these services among the various classes. As in previous chapters, this pattern will be studied in two complementary ways. First, we consider the distributional pattern among the 'aggregate' classes A and B. Second, we analyse the distribution of benefits among the five classes of landless, marginal, small, medium and large farmers.

In order to evaluate differences in the utilisation of services existing between average members of a class, we use the *Differential Index* (DI) which is defined for each village or cooperative as follows:

$$DI = CUI_B - CUI_A$$

A positive value for DI implies that for a given village or cooperative the CUI of class B is greater than the CUI of class A. This means that in that village or cooperative the relatively prosperous members of class B have used the available services more than the poorer members of class A. This would suggest a class-bias in service utilisation favouring class B members.

Village-wise data on CUI values for classes A and B are presented in Table 8.1.

Table 8.1: Number of Villages having the corresponding CUI for Class A and B

Year	1983-84		1984-85		1985-86	
CUI Values	Class A	Class B	Class A	Class B	Class A	Class B
High/Very High > 200	6	6	6	7	2	4
150 < Moderate < 200	2	2	6	3	5	5
Low/Very Low < 150	5	4*	1	3	6	4

* Data for Ambavadi not available.

If we exclude the exceptional year 1984-85 when service utilisation by both classes was very high, we notice that in 1983-84 the number of villages having a high, moderate and low degree of utilisation is the same for classes A and B. The picture changes somewhat in 1985-86: class B seems to have utilised these services more than class A, for Table 8.1 shows that in four villages the degree of utilisation for class B is very high, while this is true of only two villages for class A. Understandably, there are six villages where the degree of utilisation for class A is very low, while this is true of only four villages for class B.

It may be relevant to comment on the stability of CUI values for classes A and B at the village level. Comparing the CUI values for 1983-84 with those for 1985-86, we observe that in six villages, members belonging to class A improved their service utilisation over the last year, while in seven villages, the service utilisation of class A members worsened. During the same period, the utilisation of services by class B members improved considerably: in ten villages the level of service utilisation increased while in three villages it worsened.

In general, this analysis indicates that as the level of service utilisation improves, class B members tend to use these services more than class A members. This fact needs further comment. First, an attempt by the TVWs to improve their performance by showing higher figures for the different indicators may only be the result of class B's seizing the opportunity of utilising more and more services. Additional care should be taken to see that the higher rates of utilisation are equally distributed among the poor and the rich. Second, it may also be true that better economic conditions act as a stimulant for the more prosperous tribals to increase service utilisation whenever the TVWs offer more and better services. The link between service utilisation and the rise in productivity will tend to be more visible in the case of rich farmers. In other words, better economic conditions seem to motivate people to work at improving them even further. If proper attention is not paid to this issue, making the TVWs more efficient will make tribal society more unequal.

The use of the differential index (DI) throws more light on the class bias utilisation of services in favour of class B.

Table 8.2: Number of villages with DI in favour of Class B

	Class A	Class B
1983-84	4	8
1984-85	7	6
1985-86	3	10

For the two normal years (1983-84, 1985-86) members of class B have utilised these services more than members of class A. This confirms the conclusion arrived at earlier. Figure 8.2, which plots the distribution of DI values for all the villages during the three years presents this graphically. The fact that the number of points representing villages above the horizontal axis is far greater than the scatter of points below it shows that the utilisation of services is biased in favour of the prosperous classes. We may also add that most of the points lie between the horizontal axis which stands for a D1 value equal to zero and a D1 value of 50. This means that the bias in favour of class B is not very strong in the majority of villages.

We have finally to take up the analysis of the distributional pattern of service utilisation among the five classes.

Table 8.3: Distribution of Villages according to CUI Values for Different Classes

No.of villages where the following class has a CUI > 150	1983-84			1984-85			1985-86		
	D	Z	Total*	D	Z	Total**	D	Z	Total
Landless Labourers	2	3	5	6	3	9	3	4	7
Marginal Farmers	4	3	7	7	4	11	2	4	6
Small Farmers	5	3	8	7	4	11	4	4	8
Medium Farmers	5	4	9	8	3	11	6	4	10
Large Farmers	2	3	5	6	2	8	4	2	6

D - Dediapada
Z - Zhankhvav

* Out of a total of 13 villages; subtracting the figures under this column from 13 will give us the number of villages where the class value of CUI < 150.

** Out of a total of 12 villages.

An analysis of Table 8.3 shows that, as a class, medium farmers exhibit the greatest degree of service utilisation, and that small and medium farmers form a rather homogeneous group as regards service utilisation. These preliminary conclusions need further investigation.

The service utilisation curves for all the three years are presented in Figure 8.3. During the normal years (1983-84, 1985-86) the peaks of the two curves correspond to the CUI of medium farmers, confirming the conclusion derived earlier. For these two years there is no great divergence in service utilisation among marginal, small and medium farmers. Landless and large farmers lag behind, though in 1985-86 their CUI was equal to that of the medium farmers. This may be explained by a fall in the medium farmers' CUI during the last year rather than by a significant increase in the CUI of large farmers.

We take up now a comparative analysis of the distributional pattern among the five classes in Dediapada and in Zhankhvav. Figures 8.4 and 8.5 present the service utilisation curves for Dediapada and Zhankhvav cooperatives. An analysis of Figure 8.4 shows that during 1984-85, landless, marginal and small farmers in Dediapada experienced a great rise in their utilisation of services, so much so that marginal and small farmers account for the highest CUI. We may therefore conclude that during 1984-85, the services of TVWs were mainly utilised by the poorer classes. This phenomenon has been an isolated one, but indicates the possibility of orienting these services more to the poor. The fact that this did not happen in 1983-84 and 1985-86 shows that the services provided by Dediapada cooperative have been biased in favour of medium farmers.

The distributional pattern in Zhankhvav is more egalitarian. Service utilisation curves for 1983-84 and 1985-86 are flatter and higher than the corresponding curves for Dediapada. The rise in service utilisation that occurred during 1984-85 benefited mainly the medium and small farmers.

8.4 Conclusion

In the course of this study the exhaustive description of the main characteristics of the AHP has made the reader aware of the material and non-material costs incurred by the project. The immediate objective of the project was to prepare a trained cadre of village health workers (TVWs) ready to

transmit their newly acquired knowledge to the cooperative members. This transmission of knowledge cannot take place in a class-room but only through daily and direct contact between cooperatives and TVWs who solve a problem or provide a service. Treating a sick animal or checking a buffalo for signs of heat in the presence of the owner are the circumstances in which real learning occurs. In short, if the tribals do not avail themselves of the services provided by the TVWs, there is no real transfer of technology and the economic conditions of the cooperatives cannot improve.

This chapter, therefore, has aimed at answering this fundamental question: have the tribals used the services provided under the AHP? Depending on the answer given to this question we can arrive at some conclusions about the effectiveness of the AHP not only in solving immediate problems but in implementing its educational goals.

Looked at from this perspective, the analysis shows that the AHP has achieved its goals. The level of service utilisation has been moderate in Dediapada and high in Zhankhvav. Out of the three years studied, 1984-85 witnessed a high level of service utilisation. The reason for this sudden rise in utilisation is not known but the fact that such a rise took place leads us to conclude that during the remaining two years (1983-84 and 1985-86) the potential in service utilisation was not fully tapped.

The question of the distributional pattern of service utilisation touches a crucial aspect of the AHP : has the AHP, and ultimately, the voluntary organisation that designed and implemented it become an instrument for the benefit of the poor or of the relatively rich tribals ? The question obviously does not examine the intentions of the BSC but the actual effects of its intervention. As mentioned earlier, the TVWs and the programme were available to all. Nevertheless, if the relatively more prosperous members utilised the services more than the poor members, the AHP has finally served only to strengthen the existing inequalities. The results of the analysis can be summed up as follows:

In Zhankhvav, the distributional pattern of service utilisation is more egalitarian than in Dediapada, and each of the five classes shows a higher utilisation index than their counterparts in Dediapada. Two important conclusions emerge : the better economic performance of the Zhankhvav cooperative has been achieved without sacrificing the demands of equality. Moreover, the intensive approach adopted by the cooperatives in

Zhankhvav together with its more decentralised organisation seem to make an educational programme like the AHP easily accessible to all classes.

In Dediapada, the distributional pattern of service utilisation is more unequal. Surprisingly, large farmers have hardly availed themselves of the services provided by the AHP. Unfortunately, the same tendency is visible among the landless. Given the fact that landless labourers constitute 40 to 45 per cent of the population in the sample villages of Dediapada, that half of them have not become members of the cooperative, and that the relative few who did become members show the lowest utilisation index, we are bound to conclude that the AHP has failed to make an impact on the landless.

There are various reasons for this failure, but the emerging pattern is clear and unambiguous. This conclusion is strengthened by the behaviour of various classes in Dediapada during the exceptional year 1984-85. Unlike in Zhankhvav, where the medium farmers were the group to benefit relatively more from the general rise in service utilisation, in Dediapada the landless, marginal and small farmers utilised the services much more than the medium and large farmers. This phenomenon, it seems to us, proves that the landless had the capacity to utilise these services more frequently but they did not do so during the other two years. This compounds the failure of the AHP because it indicates that the potential for its fuller utilisation existed but that it was not drawn out, for whatever reasons, in the other two years. The responsibility for this failure, lies, at least partly, with the voluntary organisation in charge of the programme.

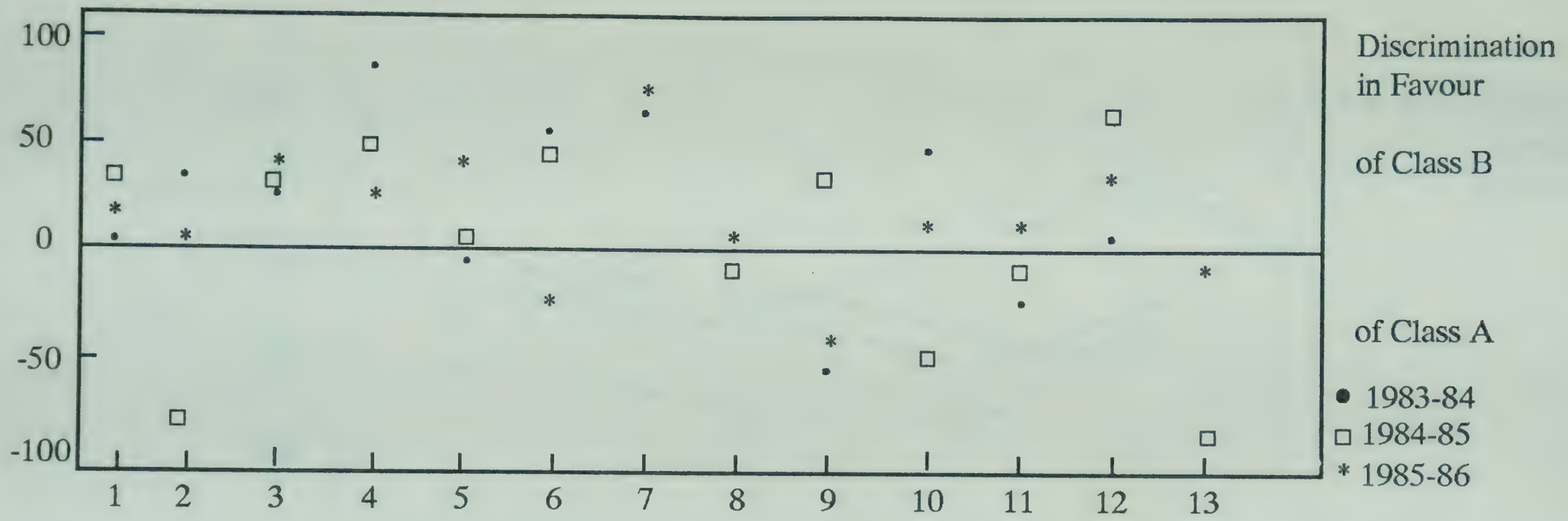
The final conclusion must again show the positive and the negative, the bright and the dark side of the reality. The AHP succeeded in reaching all classes in Zhankhvav but failed to elicit a positive response from the landless of Dediapada.

APPENDIX 8.1
COMPOSITE UTILISATION INDICES

Year Village	1983-84	1984-85	1985-86
Kevdi	19.00	153.00	67.00
Relwa	206.00	253.00	165.00
Kunbar	167.00	304.00	123.00
Gangapur	87.00	141.00	38.00
Nani Singloti	15.00	155.00	218.00
Ambavadi	228.00	135.00	140.00
Boridabara	90.00	191.00	159.00
Almavadi	109.00	190.00	135.00
Gadi	240.00	284.00	247.00
Dadakui	207.00	212.0	194.00
Umarjhar	221.00	N.A	184.00
Karutha	253.00	277.00	190.00
Umarkhadi	105.00	161.00	185.00
Dedipada	129.00	201.00	144.00
Zhankhvav	197.00	217.00	188.00
Total	150.00	205.00	180.00

Figure 8.1: Composite Utilisation Index

Figure 8.2: Village-wise Distribution of DI



1. KEVDI
2. GANGAPUR
3. BORIDABARA
4. UMARKHADI
5. ALMAVADI
6. NANI SINGLOTI
7. KUNBAR
8. DADAKUI
9. RELVA
10. GADI
11. UMARJHAR
12. KARUTHA
13. AMBAVADI

Figure 8.3: Class-wise Distribution of CUI
(for All Cooperatives)

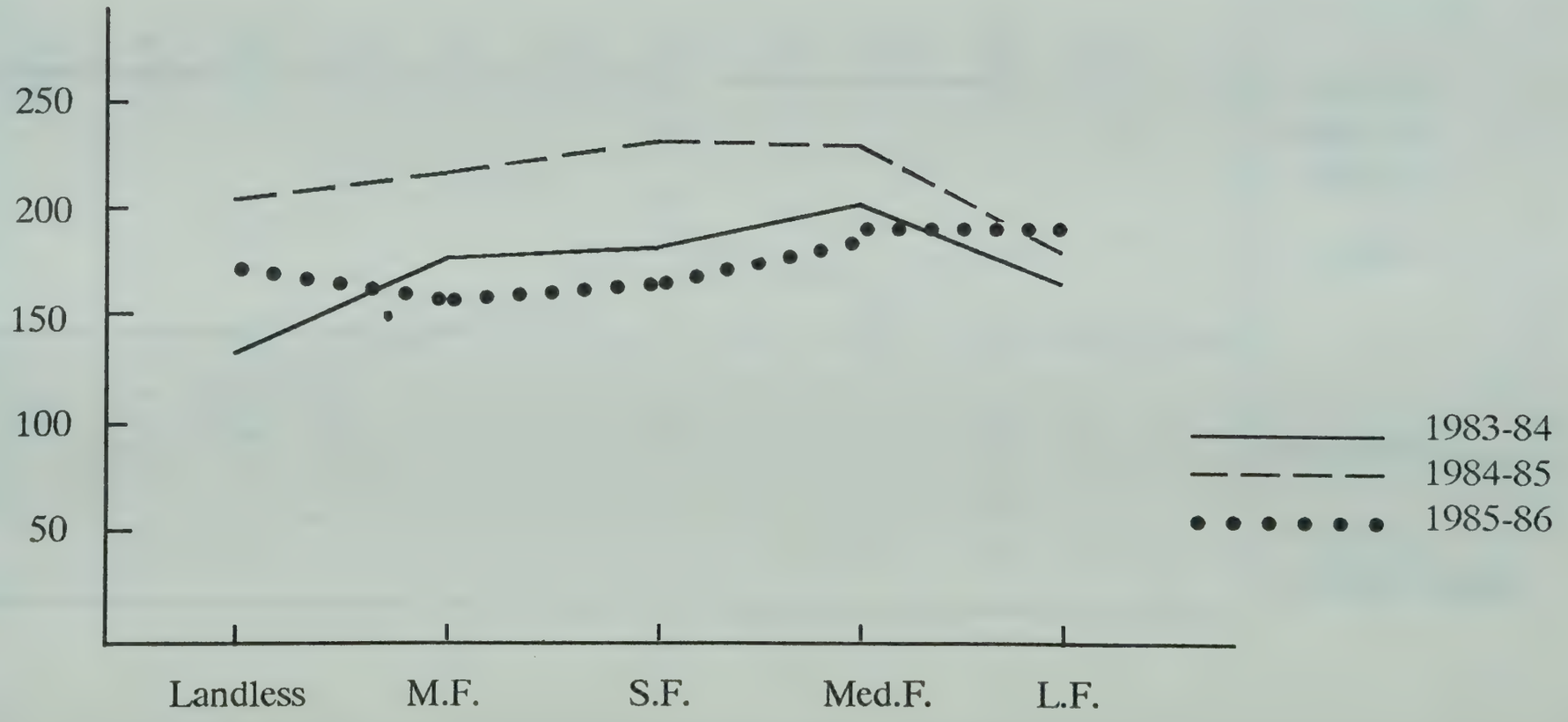


Figure 8.4: Class-Distribution of CUI Dediapada

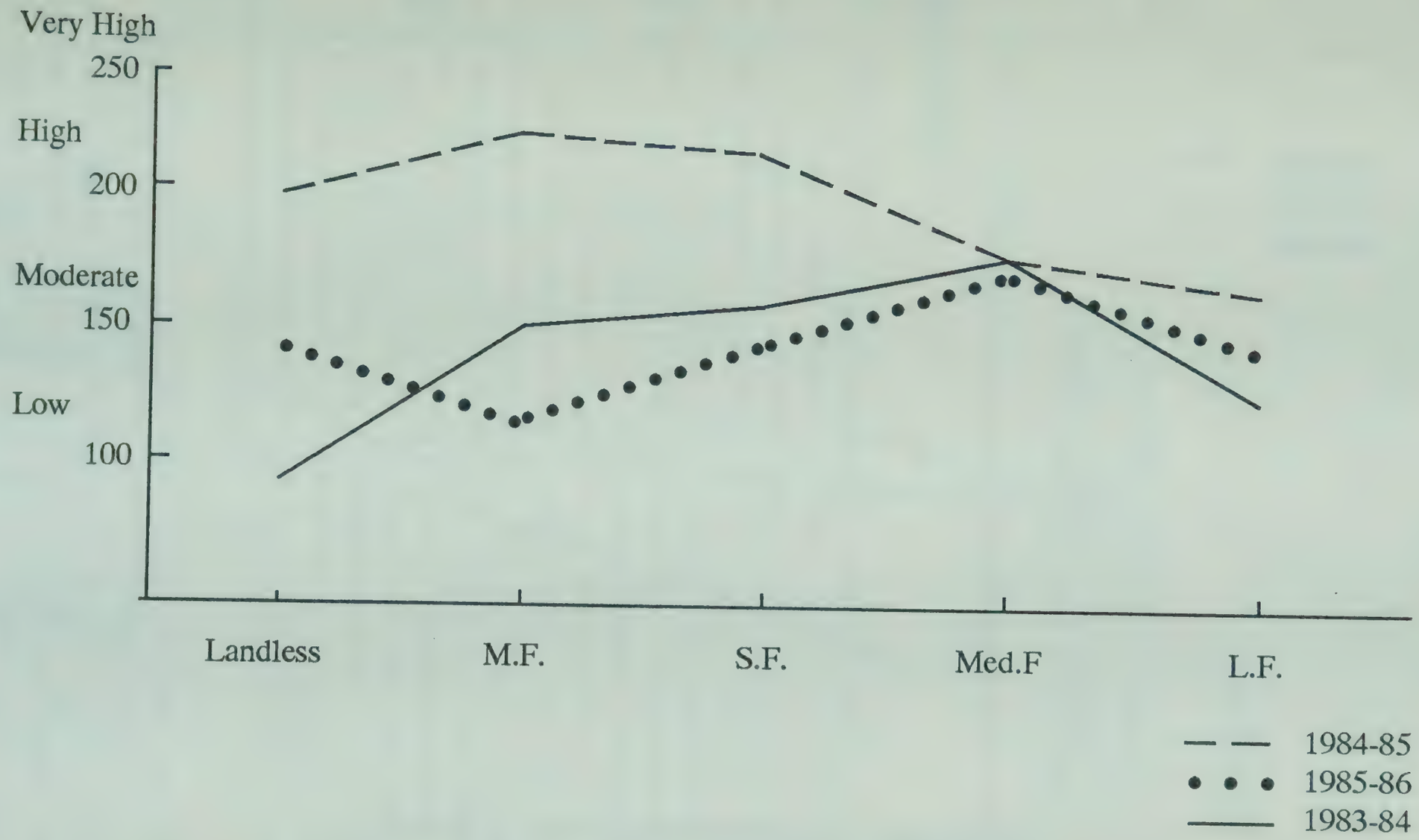
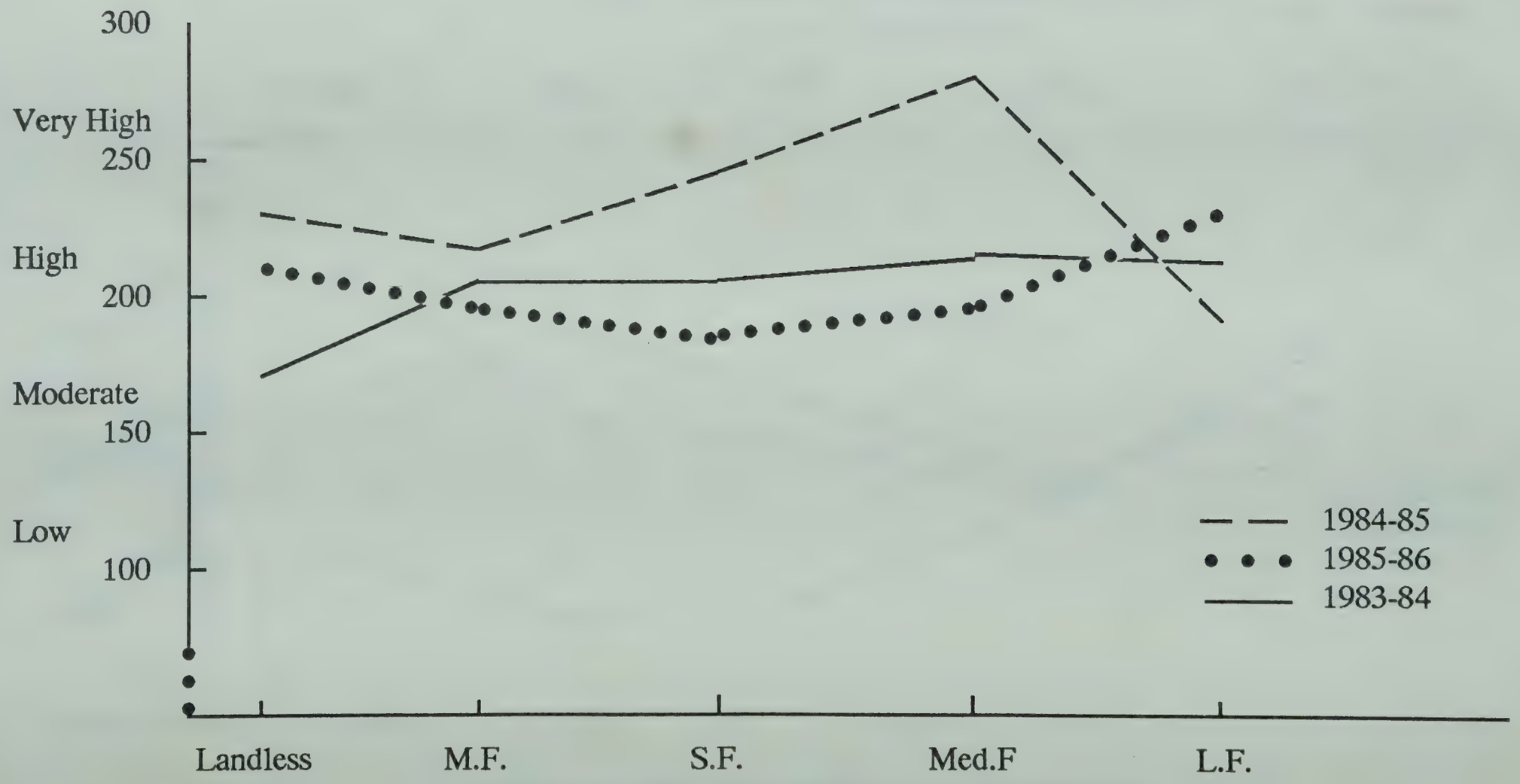


Figure 8.5: Class-Distribution of CUI Zhankhvav



Chapter 9

Levels and Patterns of Technological Diffusion

9.1 Introduction

Dairy farming for commercial purposes is a new economic *practice* adopted by the tribals of south Gujarat. The term 'practice' connotes an economic activity undertaken by a group of people accompanied by its own conceptual understanding and set of values (C.C. Harris 1980: 46). The introduction of a new economic practice into a community of people implies the adoption of a new technology and the development of a new conceptual universe. When a buffalo is reared for commercial purposes, the tribal is confronted with a new animal, a new way of feeding and handling it, a new organisational set-up which requires him to supply milk twice a day, to watch his milk being tested and scrupulously measured, and to receive every month a payment according to the quantity and quality of milk which he has supplied. This necessarily fosters a new set of attitudes: regularity, honesty (because adulteration of milk does not pay in the long run), and an understanding that such an activity may be undertaken not only for the purposes of self-consumption but mainly for sale. Production for profit now becomes an important value. This new understanding is bound to affect the conceptual universe of the tribal community.

The aim of this chapter is to analyse the extent to which the practice of dairy farming has been accepted by the cooperative members. The acceptance of dairy farming involves the acceptance of a new technique of rearing animals. A *technique* is a set of *activities* which use labour and capital in varying proportions, to produce a particular output. Each technique can be characterised by a particular set of activities which combine in a unique manner.

The acceptance level of a technique by a cooperative depends on the degree of acceptance of the technique by

(i) an individual member measured by the number of activities he has accepted out of the total set,

(ii) the whole group measured by the number of members accepting them.

The analysis of this chapter assumes the following logical sequence. If a sufficiently large number of activities has been accepted by a sufficiently large number of people we conclude that the technique of dairy farming has become part of tribal economic life; if this happens we may infer that they have accepted not only the discipline inherent in organised production but also the profit motive; if this is the case, dairy farming may be said to have been internalised. There might then be a likelihood of the tribals' conceptual universe being altered.

This chapter deals with the degree of acceptance of dairy farming, but does not claim to measure the extent to which that conceptual universe has been affected. In other words, the conclusions regarding the tribals' modified world-picture are only tentative inferences without quantitative support.

The chapter also ventures into the area of technological diffusion. The term here refers to the complex movement by which the understanding and acceptance of a new practice enables the community to become more open, flexible and ready to accept new practices or to effect substantial changes in the old ones. We deal with the issue of technological diffusion by examining the relationship between the acceptance of dairy farming on the one hand, and of a new agricultural technique on the other. The study does not claim to establish causal links between the acceptance of the two practices, that is, it does not claim that the acceptance of one is the effect of adopting the other. We are satisfied with examining the extent to which the acceptance of both practices occurs simultaneously.

By studying the degree of acceptance among the various classes regarding both the techniques of dairy farming and agriculture, we hope to examine the class-bias inherent in the process of technological diffusion.

We begin by clarifying methodology and concepts; proceed thereafter to analyse the acceptance of new techniques in dairy farming and agricul-

ture, and finally, examine the level of diffusion, that is, the correlation, if any, between the two acceptance indices.

9.2 Methodology

The analysis of a new technique requires a clear definition of the activities that comprise the technique. Table 9.1 lists the activities representative of the new technique of dairy farming; the activities include both preventive and curative care.

Table 9.1: Activities in the Technique of Dairy Farming

	Name	Importance/ Effect
1.	Investment in cattle shed	Avoids exposure to cold, heat and rain
2.	Keeping cattle shed clean	General health management
3.	Removal of ticks and fleas from animals	General Health Management
4.	Bathing buffaloes especially in summer.	Reduces body temperature
5.	Special attention to the diet of dry animals	Reduces the inter-calving period
6.	Care in restricting the movements of animals during summer and bringing green grass for them	General health and specially to prevent the cracking of skin around the feet
7.	Preliminary treatment of sick buffaloes	Disease control
8.	Filling the manger with hay every evening	Milk production is maintained if feeding is evenly spaced out

Table 9.2 lists the activities which define the new agricultural technique.

Table 9.2: Agricultural Activities

Activity	Importance/ Effect
1. Investment in land improvement	Includes terracing and land-levelling; diminishes erosion
2. Change in the design of implements	Increases the efficiency of labour utilisation
3. Use of HYV seeds	Raises productivity
4. Change in cropping pattern	Raises cash income and commercialisation
5. Use of chemical fertilisers and pesticides	Controls disease and raises productivity
6. Sale in market/yard	Increases commercialisation

The acceptance level of new dairy and agricultural techniques is analysed from two perspectives.

(i) *Activity-wise*: An examination of the percentage of members in a village/class/zone who have accepted each activity This shows the relative importance of each activity and its class-bias, if any.

(ii) *Technique-wise*: The degree of acceptance of the *whole technique* shown by villages/classes/zones is analysed with the help of an *Acceptance Index* (AI) which is constructed by assigning each individual buffalo-owner a score from zero to eight, depending on the number of activities he has accepted. The higher the score, the higher the index, and the greater the level of acceptance of the new technique.

9.3 Level of Acceptance of Dairy Farming

9.3.1 Acceptance level and class-bias of activities

Table 9.3 shows that the acceptance level of most activities (five out of eight) ranges between 75 per cent and 90 per cent of all cooperators. For two activities, the acceptance is moderate, between 52 per cent and 64 per cent, and for one it is very low (35 per cent).

Table 9.3: Acceptance of Dairy Activities

(percentage of households accepting each activity, 1985-86)

No.	Activity	Dedia-pada	Zhan-khvav	Total
1.	Investment in cattle shed	84.71	75.51	79.64
2.	Keeping cattle shed clean	84.71	93.69	89.65
3.	Removal of ticks and fleas from animal	69.93	83.88	77.12
4.	Bathing buffaloes especially in summer	63.92	91.43	80.88
5.	Special attention to diet of dry animals	55.89	48.78	51.97
6.	Care of animal movement in summer	37.59	32.86	34.98
7.	Preliminary treatment of sick buffaloes	74.97	55.51	64.23
8.	Filling the manger with hay every evening	98.45	86.12	82.68

Good health management, which is implied by the activity of keeping the shed clean, has the highest acceptance level (90 per cent). Restricting the movement of buffaloes in summer so as to prevent the skin of their feet from cracking is the activity which is least accepted (35 per cent). This may be attributed to the fact that the lack of green fodder during the summer compels the villagers to let their cattle fend for themselves.

Preliminary treatment of sick animals, and the special diet of dry animals require a certain economic standard; the moderate acceptance level of these two activities may be due to the lack of the required economic standard among the poor members.

Bathing of buffaloes in summer evokes markedly different responses from Zhankhvav and Dediapada: in the former, 91 per cent of members accept this activity compared with 64 per cent in the latter. This difference may possibly be explained by the fact that in summer there is more water retained in the ponds of Zhankhvav than in those of Dediapada.

The data presented in Table 9.3 reveals an important characteristic of the relationship between technological diffusion and levels of economic development. We cannot but be surprised by the fact that in a poor cooperative like Dediapada the acceptance level of the technique has been high: seven out of eight activities record a moderate to high degree of acceptance.

The degree of acceptance of various activities can also be analysed from a class point of view. In general, rich members (Class B) accept activities 2,3,4 and 7 in larger numbers than do poor members (Class A). By contrast, the proportion of poor members (Class A) in Zhankhvav accepting activities 1,5, and 6 (Figure 9.1) is greater than the proportion of rich members (Class B) accepting the same activities. This tendency is not so visible in Dediapada where this holds true only for activity 5.

Table 9.4: Class-wise Acceptance of Dairy Activities

No.	Activity	Percentage of total members in a class accepting these activities			
		Class A		Class B	
		Zhan-khvav	Dedia-pada	Zhan-khvav	Dedia-pada
1.	Cattle shed	82.92	81.25	67.15	83.70
2.	Cleaning cattle shed	91.62	81.88	96.47	82.61
3.	Removal of ticks and fleas	80.75	68.75	88.82	64.13
4.	Bathing	89.75	65.74	93.53	65.22
5.	Diet of dry animals	57.45	54.69	31.77	51.09
6.	Animal movement	45.03	36.25	9.41	42.39
7.	Treatment of sick animals	37.27	70.94	85.47	80.44
8.	Hay in manger	80.12	75.63	90.00	76.09

Summing up our observations regarding class-bias we observe that there is no appreciable bias for most activities except 5, 6 and 7. In the former two activities, the bias in favour of the poor has been explained above

by the behaviour of poor farmers in Zhankhvav. Activity 7 shows a bias in favour of Class B, especially in Zhankhvav: only 37 per cent of poor farmers as compared with 85 per cent of rich farmers give preliminary treatment to sick animals.

The class of small farmers in Dediapada deserves special attention.

Table 9.5: Degree of Acceptance of Dairy Farming Exhibited by Small Farmers

Activities	1	2	3	4	5	6	7	8
Accepting members as % of SF								
Dediapada small farmers	75	78	60	56	44	30	67	70
Zhankhvav small farmers	88	94	75	90	59	36	50	79
Total small farmers	80	90	77	81	52	35	64	83

Small farmers from Dediapada have not accepted the technique of dairy farming with the same enthusiasm as the small farmers of Zhankhvav. This is borne out by the fact that the percentage of small farmers from Dediapada accepting each activity (excluding activity 7) is much lower than the percentage of their counterparts in Zhankhvav. This consistently displayed reluctance suggests that they have not been eager to accept the technique of dairy farming, for whatever reasons.

9.3.2 Degree of Acceptance of the New Technique

With the help of the Acceptance Index (AI), defined in section 9.2, an attempt is now made to ascertain the acceptance level of the new technique of dairy farming as a whole, that is, as a set of eight activities.

The AI for all villages is 5.09, that is, on an average, a cooperator accepts more than half (63 per cent) of the eight activities (Appendix 9.1). Villages with a high AI are: Almavadi (7.87), Kunbar (7.09), Umarkhadi (6.69) and Kevdi (5.79). The villages where the new technique of dairy farming has not been popular are: Ambavadi (2.43), Relwa (3.58), Khokhraumar (3.70) and Karutha (3.98).

One very important conclusion that emerges from this analysis is that there is hardly any difference in the AI of a representative cooperator in Zhankhvav (5.23) and his Dediapada counterpart (5.02). This conclusion has certain important policy implications for the implementation of the AHP. The large difference in the economic levels of the two cooperatives is therefore not due to a difference in the acceptance level of dairy farming as a new technique. The important implication is that the increased acceptance of a new technology does not necessarily lead to improved economic benefits. The high acceptance level in Dediapada implies that the TVWs have succeeded in educating the tribals about the benefits of adopting the new technique. At the same time we are aware of the poor economic performance achieved by the Dediapada cooperatives. These two facts taken together indicate that the acceptance of a technology may not be a sufficient condition for the economic improvement of the tribal community. This aspect will play an important rol e in evaluating the success of the AHP.

9.4 Acceptance Level of a New Agricultural Technique

We analyse next the acceptance level of the new agricultural technology defined by a set of new activities (section 9.2); and thereafter the relationship between the acceptance of dairy farming and the adoption of the new agricultural technique. In other words, we attempt to evaluate the level of technological diffusion. Acceptance of the practice of dairy farming means acceptance of the concept and goal of *'output for sale and profit'*. We assume that the prospect of profit will motivate the tribals to effect changes in the old agricultural technique.

In general, agricultural activities have found less acceptance than dairy activities. Only three out of six activities have been accepted by more than half the members. The three activities include the use of HYV seeds, changes in the cropping-pattern and the sale of output in a market. On the whole, the most widely accepted activity is the sale of output in the market which implies increased commercialisation of agriculture. The high acceptance level of the need to change cropping patterns in response to price changes is another indication that tribals are alive to signals from the market.

Table 9.6: Acceptance of Agricultural Activities (excluding landless labourers)

	Activity	Percentage of cooperators accepting these activities		
		Dedia-pada	Zhan-khvav	Total
1.	Investment in land improvement	43.91	44.12	44.03
2.	Changes in the design of implements	29.52	43.24	37.15
3.	Use of HYV seeds	28.78	74.12	54.15
4.	Change in crop pattern	41.33	80.88	63.34
5.	Use of chemical fertilisers and pesticides	25.09	29.12	27.33
6.	Sale in market/yard	55.35	81.77	70.05

Activity 5 is the least accepted: only 27 per cent of all members use chemical fertilizers and pesticides. This low acceptance level is probably the result of virtually non-existent irrigation facilities in the area. On the other hand, more than half (54 per cent) the members use HYV seeds (Activity 3). This discrepancy in the acceptance level of these two activities appears contradictory because it is taken for granted that the use of HYV seeds requires a high dose of chemical fertilizers and regular irrigation. The tribals, however, do use HYV seeds outside the technical complementarity provided by the other two inputs. The reasons may be the following: (i) HYV seeds are used together with organic fertilizers; (ii) HYV seeds are planted during the kharif season; (iii) the yield from HYV seeds even without chemical fertilizers and sufficient water is greater than the yield from traditional seeds.

After analysing each agricultural activity separately, we use the acceptance index (AI) to gauge the acceptance level of the new agricultural technique as a whole. The fact that the AI value for an average member is 2.49 implies that the acceptance level of the whole technique has been less than moderate. The AI value indicates that, on an average, a cooperator has accepted less than half (41.5 per cent) of the six determining activities of the new technique. Clearly, the general acceptance level for the new agricultural technique is lower than the acceptance level for dairy-farming.

Given the short span of time since the introduction of the new technique of dairy-farming, it is a matter of considerable interest and some surprise to note that it seems, for whatever reasons, to be a more economically attractive proposition to the tribals than the new agricultural package. This fact shatters the assumption entertained in some quarters that tribals are not open to technological innovations. Our own observations indicate that the tribals have an intuitive understanding that the infertile nature of most of their land makes agriculture a doubtful economic proposition. Where the land is fertile they are quick to see the advantages of the new agricultural techniques. This is borne out by the higher AI value for Zhankhvav (2.86) than for Dediapada (2.06); as noted earlier, the land in the Zhankhvav area is better endowed than in Dediapada.

Table 9.7: Class-wise AI for Agricultural Technique

	Dediapada	Zhankhvav	All Cooperatives
Marginal farmers	1.79	1.91	1.85
Small farmers	1.97	2.49	2.20
Medium farmers	2.38	4.25	3.49
Large farmers	2.42	2.44	2.92
Class A	1.90	2.26	2.06
Class B	2.39	3.47	2.43
Average	2.06	2,86	2.49

There is strong evidence to suggest that, in general, the new technique has been more accepted by rich (class A) than by poor (class A) farmers. In both Dediapada and Zhankhvav, the class B farmers have a higher AI than classA farmers. However, in Dediapada, the AI increases steadily and minimally as we move from the marginal farmers to the large farmers; the difference in the AI of the class B and class A farmers is also not very significant. In Zhankhvav, however, the AI for medium farmers is substantially higher than for the other three classes. This high value of AI for medium farmers in Zhankhvav has pushed the AI for all medium farmers

upwards and this may explain the fact that medium farmers as a class show the highest acceptance level of the new agricultural technique.[1]

9.5 Relationship between the Acceptance of New Dairy and Agricultural Techniques

We assumed at the beginning of this chapter that technological diffusion might be inferred to have taken place if there exists a positive correlation between the AI of dairy farming and the AI of a new agricultural technique calculated at the village level. This section examines this issue.

Before we take up this analysis it may be appropriate to record in passing the exceptional efforts made by the TVWs to introduce dairy farming. The analysis in this chapter has made it amply clear that the AI for dairy farming is relatively higher than the AI for the new agricultural technique. This is so in spite of the glaring fact that agriculture has been an older occupation and one that has received a great deal of attention and support. The success of dairy farming only goes to show that agricultural techniques can also change if proper and sustained *educational* efforts are made.

We present briefly the results obtained by estimating the correlation coefficient between the AI for dairy and agricultural activities. The correlation coefficients are estimated on the series of AIs (dairy and agricultural) for household members. The same methodology has been applied to compute the partial correlation coefficients between the acceptance levels of these two sets of activities, when landholding and the service-utilisation index are kept constant (Table 9.8).

For seven out 12 villages the correlation co-efficients are *positive*, though none expresses a strong relationship. In Khokhraumar there is a moderate positive correlation between the two variables, while in Umarjhar, Karutha, Dadakui and Umarkhadi, the positive relation is very mild.

The sign and absolute size of the partial correlation coefficients demonstrate that the relation existing between the two acceptance levels is *not* i nfluenced either by landholding, or by the degree of service-utilisation,

1. Large farmers of Dadakui and Khokhraumar show the highest AI (6). It is significant that in Dadakui the AI for the village as a whole is as low as 1.56, and we may conclude that other classes in the village have hardly accepted the new technique.

or by both, because when the latter two are kept constant, both the simple and partial correlation coefficients are, for all practical purposes, identical.

Table 9.8: Correlation Coefficients

	Simple		Partial	
	r_{DA}	$r_{DA, U}$	$r_{DA, L}$	$r_{DA, LU}$
Khokhraumar	0.42	0.42	0.39	0.41
Umarjhar	0.30	0.30	0.29	0.29
Karutha	0.30	0.30	0.30	0.30
Dadakui	0.26	0.25	0.29	0.30
Umarkhadi	0.21	0.22	0.19	0.19
Kevdi	0.13	0.17	0.12	0.16
Gangapur	0.09	0.09	0.16	0.17
Kunbar	0.00	0.00	0.00	0.00
Almavadi	0.00	0.00	0.00	0.00
Boridabara	-0.07	-0.12	-0.19	-0.18
Ambavadi	-0.18	-0.19	N.A	-0.16
Relva	-0.20	-0.13	-0.13	-0.13

D = AI of dairy activities
A = AI of agricultural activities
U = Index of Service Utilisation
L = EOL

We may therefore conclude that in all the villages of Zhankhvav and in one village in Dediapada, namely, Khokhraumar there is a mild positive relation between the acceptance of the two sets of activities, though we should not assign any causal priority to either of them. A process of technological diffusion seems to have started in the villages of Zhankhvav. We may infer that the cooperators from Zhankhvav have not only accepted a new activity but have, to some extent, internalised a new set of goals and values, and that their acceptance of a new *practice* suggests a modification of their conceptual and cultural universe.

9.6 Conclusion

Considering the issue of technological diffusion as a whole, the message conveyed by this chapter is optimistic on two counts: *first*, it shows that the laborious struggle of the educational process inherent in the AHP has borne fruit, fruit which generally eludes precise quantification, but none the less real; *second*, it demonstrates the innate readiness of tribal society to accept new technologies which are properly introduced and economically meaningful.

A brief summary of the results obtained will support these two points. The acceptance level of the technique of dairy farming is moderately high, since an average cooperator has adopted five out of the eight listed activities. The fact that this happened in a span of five to six years, and the somewhat incredible fact that the buffalo was a new animal to the tribals and activities connected with buffalo-rearing unfamiliar to them, are facts that bear repetition.

The chapter throws light on another important issue. As noted earlier, the economic performance of the Zhankhvav cooperatives has been better than that of Dediapada. Surprisingly, there is no significant difference in the acceptance level of dairy-farming as measured by the AI between the cooperators of Zhankhvav and Dediapada. We may therefore conclude that a higher acceptance level of dairy-farming need not necessarily lead to improved economic performance.

The remarkable fact about dairy farming is that its acceptance does not exhibit any class-bias against the poor: the AI for landless labourers, marginal and small farmers is 5.48, 4.90 and 5.13 respectively, while the AI for medium and large farmers is 5.30 and 4.74 respectively. Tribals, no matter how poor their economic condition may be, seem to be equally ready to accept dairy farming.

Turning now to the acceptance of a new agricultural technique, we first consider the activities separately, and then the technique as a whole. The fact that 75 per cent of all tribals sell their output in the market/yard, and that 63 per cent have introduced changes in the cropping pattern indicates an increase in the commercialisation of tribal agriculture. This clearly suggests that a majority of tribals produces a marketable surplus, however small, and that commercialisation of agriculture has come to stay in their society.

The fact that only 27 per cent of the tribal members use chemical fertilizers and pesticides may be the effect of lack of irrigation. The lack of irrigation facilities sets a clear limit to the possibility of agricultural growth in this region.

The technique as a whole exhibits a lower level of acceptance than dairy farming; has been more accepted in Zhankhvav than in Dediapada; and shows a clear class-bias in favour of medium farmers, especially in Zhankhvav. The last mentioned finding indicates that the new agricultural technology strengthens and deepens the existing unequal relations in tribal society.

The problem of technological diffusion was studied through an analysis of the correlation coefficients between the AI values for dairy farming and the new agricultural technique.

For most villages the correlation coefficients are positive, though their size is small. We sum up the findings as follows:

(i) In all the villages of Zhankhvav there is a mildly positive correlation between D (AI of dairy activities) and A (AI of agricultural activities) indicating that a process of technological diffusion has already started.

(ii) Land holding and service utilisation do not make much difference as regards the level of acceptance of D and A in Zhankhvav.

(iii) In Dediapada, there is hardly any relationship between the acceptance level of D and A. Actually, in three out of seven villages, there is a very small negative correlation between the acceptance of D and A. This may indicate that the level of technological diffusion in this least developed area is absent.

We may conclude by saying that the process of technological diffusion, as defined in this chapter, is operative in Zhankhvav but not in Dediapada. It seems that the educational efforts of the AHP are not capable of setting this process in motion. The facts suggest that where external factors (as in Zhankhvav) have made possible the acceptance of a new agricultural technique, dairy farming seems to have found a congenial atmosphere to develop; and where external factors (as in Dediapada) prevent the development of a new agricultural technique, the acceptance of dairy farming cannot by itself alter these factors and hence it cannot lead to a change in agricultural techniques.

We may therefore conclude that our hypothesis regarding the possibility of inducing a change in agriculture through changes in dairy farming is not valid.

This brings us to our final consideration — the extent to which changes in the cultural universe have occurred and the effect of these changes on the adoption of new techniques. The results of this chapter indicate that while, as regards dairy farming, a new set of attitudes (the profit motive) has been developed, this cannot *per se* induce any change in agricultural practices unless the existing external obstacles are removed. A possible discontinuity between an altered *episteme* and practical activity may be the explanation for the increasing frustration among the tribals who are caught between new internalised goals and insuperable obstacles that block their attainment.

APPENDIX 9.1
ACCEPTANCE INDEX FOR DAIRY ACTIVITIES

Class village	Landless Labourers	Marginal Farmers	Small Farmers	Class A Farmers	Medium	Large	Class B	Av
Gadi	5.70	0.00	5.83	5.75	5.80	2.67	4.63	5.38
Nani Singloti	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A
Khokharaumar	3.77	3.57	3.24	3.52	4.55	5.00	4.58	3.70
Gangapur	5.78	3.75	5.50	5.62	5.13	6.33	5.46	5.29
Kunbar	6.88	7.90	6.93	7.15	5.67	8.00	6.60	7.09
Almavadi	7.97	8.00	8.00	7.98	8.00	6.67	7.45	7.87
Kevdi	5.35	5.67	5.54	5..46	6.43	6.00	6.38	5.79
Ambavadi	0.00	2.54	3.00	2.64	3.00	1.00	1.67	2.43
Relwa	2.75	3.67	3.47	3.38	4.43	3.00	4.11	3.58
Boridabara	3.00	3.67	3.47	3.38	4.43	3.00	4.60	4.05
Dediapada	5.31	5.26	4.76	5.23	5.34	5.58	5.48	5.02
Umarkhadi	5.90	6.14	6.32	6.03	6.62	3.50	6.64	6.69
Umarjhar	7.00	3.67	5.39	5.18	5.76	4.43	5.05	5.12
Dadakui	5.60	3.93	6.35	5.03	5.25	7.00	5.60	5.13
Katkuva	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A
Karutha	3.79	3.54	4.13	3.91	4.52	3.25	4.32	3.98
Zankhvav	5.63	4.56	5.58	5.39	5.27	4.44	5.09	5.23
TOTAL	5.48	4.90	5.13	5.32	5.30	4.74	5.22	5.09

Conclusion

This concluding chapter attempts to link the insights gained from the foregoing chapters with the questions raised in the introduction about the developmental role of OF and, within that frame, the role of the NGDOs. To put it differently: does the BSC's intervention in the tribal milk cooperatives functioning under the SUMUL umbrella throw any light on these two issues? Is the BSC's solution in the form of a TVW system and Animal Health Programme (AHP) a meaningful answer to the "problem" surrounding OF? The impact of this intervention by the BSC has been scrutinised at the economic level (Chapters 1-4) and at the social level (Chapters 5-9). The subject of each chapter has dictated its conclusions; hence they are partial and limited; they may now be set against the broader, more general perspectives provided in the introduction and possibly generate relevant answers to the questions raised therein. In other words, the Introduction and Conclusion of this book may be seen as addressing each other over the solution offered by the BSC's intervention, or alternatively, as two pillars that raise and support the analysis of a micro reality to the level of the macro problematic.

Two general questions were raised in the Introduction. The first dealt with the developmental nature of OF, and the second with the relevance of an NGDO's intervention. Both these issues are discussed here one after another. The criteria chosen to determine the developmental nature of any programme, including OF, were: economic independence, social equity and organisational competence.

Economic independence of the target group will be achieved by an efficient use of resources resulting in higher income levels for the beneficiaries. The study has analysed the effects of dairy farming on the *net income* (net off all cuts) of the cooperators. The average annual net income per cooperative member increased in Zankhvav from Rs.2,180 to Rs.3,020 over

a three-year period. The increase in net income for the two cooperatives has been from Rs.6.5 lakhs to Rs.7 lakhs in Dediapada, and from Rs.8.5 lakhs to Rs.13.5 lakhs in Zankhvav. One may note that a single year (1984-85) saw an inflow from dairying of net income amounting to more than Rs.20 lakhs.

By collecting milk twice daily and paying the cooperators a reasonable price for it every month in cash, OF has injected a considerable extra income into the life of the tribal poor in South Gujarat. The fact that this income is in cash favours the monetisation and commercialisation of a subsistence economy and helps to integrate it with the mainstream. Furthermore, because the income has flowed from a productive activity and not from a mere employment-providing scheme, assets have been enhanced and created.

A comparison with the per capita income of Gujarat will highlight the relative importance of this increase in net income. The average per capita income for Gujarat at current prices was Rs.2,772 in the year 1985-86. In 1984-85 a Zankhvav cooperator received more than one and a half times this amount as income accruing only from milk, while his counterpart in Dediapada obtained one-third of this amount from the same source. This comparison highlights the relative importance of milk-income in the total income of the household. Income from milk constitutes a substantial part of the total income of a household.

If we consider the relative importance of milk income as cash in the total cash-income of the household these figures are still higher : 40 per cent in Dediapada and 65 per cent in Zankhvav. This clearly indicates that the increase in cash-income through dairying has played a very decisive role in the economic life of the tribals. There can be no doubt that the fact of monthly cash payments gives them far more opportunities to diversify their consumption-basket. In short, the contribution of OF in increasing the income of an average cooperator has been undoubtedly positive.

However, the picture is not quite as bright as might appear at first. The number of cooperators not receiving any income from the sale of milk because their animals are dry or have died in the course of the year is widespread and rising. On an average, 36 per cent of cooperators received no income from milk in 1984-85, and this figure rose to 53 per cent in 1985-86.

This situation suggests that the official policy of increasing milk output through subsidized distribution of buffaloes in the tribal areas is a very short-

sighted one and inimical to the larger interests of the tribals. Even with the help of the AHP introduced by the BSC, half the cooperators are, for all practical purposes, outside the whole scheme because, owing to dry or dead animals, they cannot sell milk. The situation in those backward tribal areas where there are no NGDOs may be left to the reader's imagination. The burning question is this : is OF really interested in increasing, in the long run, the productivity of these cooperatives?

The economic efficiency of a project depends also on whether it has induced increases in productivity. In this study we consider productivity per animal and productivity per cooperator.

The claim made by OF and SUMUL that milk output has been increasing in the period under study is true, but this may have little to do with economic efficiency if output increases are not the result of productivity changes. In Zankhvav the total milk output increased from about 3 lakh litres in 1982-83 to 3.86 lakh litres in 1984-85, while in Dediapada it rose from 4.61 lakh litres to 5.31 lakh litres. It is true that five years earlier this huge flow of milk was non-existent in these two cooperatives. As mentioned above, the problem is not one of output but of productivity. SUMUL has succeeded in increasing the milk intake from tribal areas to satisfy the urban needs of Bombay and Surat, but as we shall see, has done little to raise productivity by providing health facilities, and improving breeding practices. The truth is that the increased milk output is mainly the result of the buying of new buffaloes.

This book has shown that, the BSC's intervention through its AHP notwithstanding, the small increase (14 per cent) in milk output in Dediapada cooperative is explained by the fact that the stock was more than doubled (132.5 per cent) in three years through a massive importation of new animals. In Zankhvav on the other hand, the AHP has succeeded in increasing productivity per animal; the yields per in-milk animal and per milch animal have both risen by 20 per cent.

From these facts one may justifiably infer that without the intervention of the BSC the increase in milk output would have disappeared after the initial spurt in the first few years. The conclusion stares one in the face : SUMUL's inability to provide the required services in animal health and breeding practices make the intervention by NGDOs imperative.

Productivity also depends on stock build-up; this involves controlling the mortality rate of calves and female cattle. Before the (AHP's) introduction of a systematic vaccination campaign by trained village workers the mortality rate in Zankhvav and Dediapada was very high: 311/1,000. By 1982-83 it had dropped to 61/1,000 in Dediapada and 26/1,000 in Zankhvav and had more or less stabilised at these levels. Here is yet another indication of SUMUL 's lack of interest in increasing the productivity of the cooperatives.

Economic efficiency in the long run depends on the preservation and enhancement of the eco-system. While this study has not directly analysed the impact of OF on the eco-system, indirect evidence recorded during the investigation reveals that the impact is negative for there are indications that the nutritional standards of the herd have deteriorated. Both, utilisation of surplus agricultural by-products as animal feed and the sale of concentrate feed per cooperator, have steadily decreased year after year even in a flourishing cooperative like Zankhvav. Furthermore, the availability of "commons" for grazing cattle has diminished in both cooperatives, indicative of a tendency, apparent all over India, to privatise common land.

We may reasonably infer that OF has increased the pressure on fodder availability in an already saturated and deteriorating fodder situation, thereby destroying the delicate balance between grazing land, crop land and forest land. The tragedy is that even this overexploitation of nature for fodder has not succeeded in improving the nutritional standards of the herd.

Economic efficiency is generally the result of technological innovation; the greater the degree of technological change effected, the more successful the developmental programme. This study has explained the level of technological transformation by measuring the degree of acceptance among tribals of the new technique of dairy farming. This new technique can also be understood as a new economic *practice*, in the sense that a new set of activities is coupled with a new conceptual understanding and set of values—production and sale of milk for profit. The new technique of dairying has been defined in terms of a set of eight activities. The degree of acceptance by the tribals is measured by the proportion of cooperators accepting each activity and by an index reflecting the acceptance of the whole set of activities by a group or cooperative.

The study has shown that dairy farming as a technique has been moderately accepted inasmuch as an average cooperator accepts more than

half of the eight activities. Except for one activity–restricting the movement of buffaloes in summer–which was accepted by only 35 per cent of the households–all the other activities were adopted by more than 50 per cent, and of these, four were adopted by about 80 per cent of the households.

These figures clearly indicate that tribals are open to technological innovation. It must be noted that buffalo-rearing for commercial purposes was a totally new activity in the tribal belt under study. The effort required in the transfer of this new technology was of a two-fold nature: first, of making the tribals familiar with this activity and enabling them to see its relevance; and second, of ensuring that it is performed continuously and adapted to the local situation. This fact shatters the assumption entertained in some quarters that the tribals are not receptive to technological innovation. Were SUMUL and OF to take the educational component more seriously than they do at present, similar technological transformations would be possible in other backward areas.

This study has also discussed the acceptance level of a new agricultural technique. Compared with dairy farming, the lower level of acceptance of this new agricultural technique is striking: on an average, a cooperator has accepted less than half of the six activities determining the new agricultural technique. For example, we find that only 27 per cent of households use chemical fertilisers and pesticides, 37 per cent have introduced changes in the design of implements, and 44 per cent have invested in land improvement. However, the tribals seem to be more inclined to use HYV seeds (54 per cent), to change crop patterns (63 per cent), and to sell in the market/yard (70 per cent). This last fact reveals that two-thirds of the tribal households surveyed possess a marketable surplus.

Equity is the second criterion by which the success of a development project may be judged. There is an unstated belief in the egalitarian nature of tribal society; tribals share equally in poverty. The fact that they are poorer than others is true. Compared with the non-tribal areas of Surat district the economic position of the tribals in Dediapada and Zankhvav is much lower. This helps the belief that poverty is concomitant with equality. The reality, nevertheless, is different. One often hears the complaint that tribal elites exploit their own people and corner the benefits provided by development programmes. The findings of this study give out the same dangerous signals. The class composition of the villages studied is as follows: 76 per cent of all the households are landless labourers, marginal farmers, and small farmers,

and the remaining 24 per cent are medium and large farmers. More specifically, 37 per cent are landless labourers and they form the largest group. This population of landless labourers is concentrated in the less economically developed villages, as well as in those other villages where emergent capitalist relations exist. Small farmers form the second largest group: 24 per cent of all the households. This study has indicated that small farmers are the source from which the marginalised and landless arise: villages with a high proportion of landless labourers and marginal farmers have a decreasing proportion of small farmers.

A clearer picture of the unequal hold over resources emerges from the fact that 24 per cent of medium and large farmers control 67 per cent of the effective operational land (EOL). This unequal distribution of power over resources is highest in a village classified as highly developed with a large proportion of hired labour. The inequality index used in this study shows also that on the whole the less developed villages of Dediapada have a higher inequality index than the more prosperous villages of Zankhvav. One may infer from this that low levels of development in a tribal community co-exist with high degrees of inequality, and that the few villages where hired labour is most frequently used also have a high level of inequality in the matter of land distribution.

All these considerations should be kept in mind when analysing the impact of OF on the present levels of inequality. The *social* impact of OF has been determined by analysing the pattern of buffalo-ownership, the class-composition of the cooperative members, the distribution of total income and cash benefits and the class differences in the utilisation of services provided by the AHP.

Regarding the relationship between land and buffalo ownership the study has shown that the correlation between the amount of land and the number of buffaloes owned by the average representative of a particular class was negative for five out of seven villages and insignificantly positive for the other two. This clearly indicates that buffaloes are more equally distributed than land and that the distribution of buffaloes has tended to offset the unequal distribution of land.

Does membership in the cooperatives reflect the class structure of the village or is it biased in favour of the poor ? If the latter is true then one may speak of the cooperative as effecting a radical change in the existing structure of inequality. In other words, if a particular group like that of the landless

labourers constitutes 40 per cent of the village households, yet forms only 10 per cent of the cooperative membership, one may conclude that the cooperative has discriminated negatively against this poor section. This may not have been intentional, but the fact that so many have not joined the cooperative, for whatever reason, justifies the use of the term "negative discrimination". This study shows that there has been discrimination of this kind on the part of the cooperative against landless labourers, marginal farmers and small farmers vis-a-vis the other two groups of medium farmers and large farmers. To put it simply, members from the latter richer groups are represented in relatively larger numbers in the cooperatives than in the village. More specifically, the class of landless labourers has been the most affected. A positive feature is, that in the Dediapada villages under analysis, small farmers are better represented in the cooperative than in the village. The overall picture suggests that cooperative membership appears to draw a dividing line between landless labourers and marginal farmers on the one hand, and small farmers, medium farmers and large farmers on the other. To say that the cooperatives have not helped the poor would be too sweeping a generalisation. To say that the landless labourers and marginal farmers are relatively outside the cooperatives is to state a true fact.

A dramatic rise in income has been one of the positive social aspects of tribal dairy cooperatives. We have seen that this 'milk-income' forms a substantial part of the total income and cash income of tribal cooperative members. This study has confirmed the intuition based on common sense that for the poorer classes or groups, the relative importance of milk income and cash in their total earnings is much higher than for the richer groups. This indicates the tremendous potential of OF for making an impact on the income levels of the poor, but also that the full potential has not been really tapped. This potential remains largely unrealised because the landless form the highest percentage of the total members not selling milk in a year, and therefore receiving no milk-income, and therefore remaining for all practical purposes, outside OF. It is disturbing to note that this percentage of the poorest who do not sell milk has been increasing from year to year.

As regards the impact of buffalo-rearing on the education of children, this study has shown that one-third of children of school-going age are kept away from school. There seems to be no discrimination between boys and girls, but when the need for child-labour exceeds a particular level (25 per cent-30 per cent), the additional requirement is met most often from the pool of available female child-labour.

As the level of service utilisation generally improves, the proportion of medium and large farmers availing themselves of these services is greater than the proportion of landless labourers, marginal and small farmers. This again underscores the fact that in a programme like the AHP, the more prosperous sections take greater advantage of its services. Any NGDO needs to keep this factor firmly in mind. This study has also shown that for one year, 1984-85, marginal and small farmers showed the highest index of service utilisation. This phenomenon may be an isolated one, but it is a sign of the potential for such utilisation by the poorer classes. This is also borne out by the fact that in a more flourishing cooperative like Zankhvav, the distributional pattern of services is more egalitarian.

In the light of what has been said above, one feels that Baviskar's doubts about the effectiveness of cooperativism in overcoming inequality are confirmed.

The third criterion by which the success of OF as a development project may be judged is the potential of the programme to increase the organisational power of the poor. An integral part of OF is the development of milk-producers' cooperatives according to the Anand pattern and OF maintains that these cooperatives strengthen the organisational power of their members. To evaluate more specifically this claim the study, it may be recalled, understands a cooperative as playing a dual role, first, as an economic enterprise; and second, as a social institution.

We may remark that this study has distinguished between two organisational models utilised by the cooperatives in South Gujarat: the centralised adopted by Dediapada, and the decentralised, followed by Zankhvav. Each model is the outcome of a different response to a widespread situation of poverty. The centralised model of Dediapada corresponds to an *extensive* approach. This approach appears to be more sensitive to the extended poverty conditions in a given area and seems to take for its motto: "cover as many villages as possible". The decentralised model of Zankhvav corresponds to an *intensive* approach. This approach appears to be more sensitive to the intensity of poverty conditions in a given area and to the pressing need of ensuring that they are reversed; it seems to take for its motto: "make sure you succeed in the few villages you cover".

In what follows we analyse the dual aspect of the cooperatives in the context of these two models: the centralised cooperative of Dediapada taking

care of *about* 40 villages, and the decentralised model of Zankhvav covering eight villages each with a separate cooperative, and all sharing a common office. What light does the study throw on the extensive and intensive models in the context of the dual role of the cooperative?

As an economic organisation the cooperative must ensure that all members stand to gain and that the financial position of the organisation remains on a sound footing. The benefits accruing to the members must not be obtained at the cost of the organisation's stability, while the latter should not become an end in itself at the expense of its members.

As already mentioned, the annual net income of a cooperator in Dediapada fell from Rs.1,022 in 1982-83 to Rs.842 in 1984-85; while in Zankhvav the annual net income rose from Rs.2,178 in 1982-83 to Rs.3,020 in 1984-85. It may be remembered that these are figures for the average cooperator; the picture darkens when we consider members who cannot sell milk; in Dediapada the proportion rose from 35 per cent in 1984-85 to 59 per cent in 1985-86, while in Zankhvav it increased from 40 per cent to 44 per cent. It is clear that the extensive model has been less successful than the intensive model.

To assess the financial profile of the two cooperatives the study has analysed the value of fixed assets and capital accumulation in the Dediapada and Zankhvav cooperatives. Capital accumulation per cooperator, which includes share capital, reserve funds and accumulated profits, is higher in Dediapada than in Zankhvav: in 1984-85, it was Rs.580 in Dediapada, and Rs.330 in Zankhvav. This difference can only be explained by the fact that Dediapada has much greater reserve funds than Zankhvav. This is borne out by the fact that in 1984-85 Dediapada cooperative retained Rs.22 per month per member, while Zankhvav retained only Rs.5. This striking difference indicates that, to a great extent, institutional needs are satisfied at the cost of the individual. Mention should be made, however, of the special difficulties faced by Dediapada cooperative. It has to undertake the responsibility of collecting milk and delivering it to a chilling-centre simply because it is not situated in Surat district, and cannot, therefore, make use of the collecting facilities provided by SUMUL. In addition, it has had to set up an elaborate fat-testing procedure to prevent malpractices in the chilling-centre. All these are infrastructural costs to be paid by the cooperator. This situation is reflected in the difference in value of fixed assets in both cooperatives. Fixed assets per cooperator in Dediapada increased from Rs.252 in 1982-83 to

Rs.428 in 1984-85. For the same period, fixed assets per cooperator in Zankhvav increased from Rs.43 to Rs.58. This difference of value in fixed assets is explained by the additional requirements of Dediapada in the form of a truck, fat-testing machines, a new office, etc. In short, a centralized organization which has to bear additional costs had made great inroads into the incomes of individual producers.

We turn now to the social role played by these two cooperatives. This analysis assumes a greater importance when we consider that the index of inequality used in this study is much higher for Dediapada than for Zankhvav, and that Dediapada cooperative operates in a poorer area. The burden of redressing this inequality is therefore greater for Dediapada. Whether in fact it has succeeded in reducing these inequalities will emerge from an analysis of the following indicators: coverage of households, class-distribution of members, class-distribution of income and cash from milk, class-utilisation of services, and technological diffusion among various classes.

As regards coverage of households, the intensive model of Zankhvav performs better: on an average, 75 per cent of all village households have become members. In the extensive model of Dediapada, only 50 per cent of households in each village have become cooperative members.

Regarding the class-distribution of cooperative members Dediapada may be said to have discriminated against the poor inasmuch as the proportion of the poorer groups (landless labourers, marginal and small farmers) in the cooperatives is less than their proportion in the village. This discrimination takes on a sharper edge when one takes account of the fact that medium and large farmers have been favoured in Dediapada. In Zankhvav, the situation is quite different: landless labourers have been favoured in three out of the five sampled villages, and in only one village is there a bias against the landless; in four out of five villages, marginal and small farmers have been favoured. It seems clear that the extensive model, despite its good intentions, seems to be less sensitive to reducing inequalities, perhaps because the very poor are too poor to be helped.

The manner in which income and cash from milk have been distributed among various classes in the cooperatives of Dediapada and Zankhvav reveals that these two cooperatives have played a different social role. Since the distributional patterns of income and cash from milk are similar, we analyse below only the milk-income distribution among various classes.

In the cooperatives of Zankhvav, the distribution of milk-income has been biased in favour of the poor. From 1984-85 to 1985-86, the share of milk income in the total income of the poorer households (landless, marginal and small farmers) rose from 58 per cent to 66 per cent. The trend for rich farmers is different: the share of milk income for medium farmers rose from 41 to 50 per cent, and for large farmers it declined from 20 per cent to 18 per cent. Dediapada presents an altogether different picture; during the same period, the share of milk income for landless, marginal and small farmers remained stable at 36 per cent, while the share of milk income for medium and rich farmers was around 25 per cent. In both cooperatives the share of milk income of the poor is higher than that of the rich but in Zankhvav this share of the poor attains a higher level than in Dediapada.

We can clarify still further the different distributional pattern of milk income among the poor in these two cooperatives. Thus far, we have compared the share of milk-income for the poor as a group in Zankhvav with that in Dediapada. We now present the comparative figures for each of the classes constituting the poor. In Zankhvav, the share of milk-income for landless labourers was around 70 per cent while in Dediapada it was 38 per cent; for marginal farmers it was 53 per cent in Zankhvav and 32 per cent in Dediapada; for small farmers it was around 59 per cent in Zankhvav and 28 per cent in Dediapada.

We may conclude from the above that the income and cash benefits have been much greater for the poor of Zankhvav than for the poor of Dediapada.

The pattern of service utilisation is more unequal in Dediapada than in Zankhvav. In Dediapada, the index of service utilisation for landless and marginal farmers is "low" on the scale used, while in Zankhvav, it is "high". We may also note that, in Zankhvav the values of the utilisation index are similar for all classes; inter-class parity in service utilisation is higher than in Dediapada. We may finally note that in Zankhvav each of the five classes shows a higher utilisation index than their counterparts in Dediapada for all three years.

There is also a marked difference between Zankhvav and Dediapada regarding the manner in which technological diffusion has taken place among various classes. In Zankhvav, landless, marginal and small farmers have accepted dairy-farming to a greater extent than medium and large farmers; the reverse is true in Dediapada.

All the evidence gathered by this study indicates that the decentralised model adopted by Zankhvav has provided more economic benefits to its members and, equally important, has succeeded in tilting the balance in favour of the poor. This suggests that in the decentralised and intensive model, the poor have been able to increase their organisational power. The centralised model of Dediapada has fulfilled neither the economic nor the social role to a satisfactory degree. At the economic level, only about 40 per cent of cooperators have been receiving a moderate annual income. The failure of the centralised model and its extensive approach is even more obvious in the fulfilment of its social responsibility. Even the NGDO has not succeeded in making the cooperative an instrument to strengthen the organizational power of the poor.

We come finally to an assessment of the role of the NGDOs in the implementation of OF. The NGDO's positive contribution is characterised by a set of educational inputs, the content and the methodology of which are both significant. The content comprises technical skills and the tribals' increased awareness of their own situation. The methodology involves continuous in-service training, learning by doing, and supportive learning in the presence of the doctor. It also involves the creation of an organisation of TVW groups that meet for discussions and support one another. Clerical and administrative skills have been provided to strengthen the cooperative office. Education at the organisational level is ensured by linking the TVW group with the offices and management committees of each cooperative. In addition, managerial inputs are provided through the establishment of an information system which clarifies roles, and helps in self-planning and monitoring.

This positive contribution is also characterised by a set of welfare outputs arising from the in-service training. First, the TVWs became the educators of the cooperators, providing a diffusion element. Second, their enhanced skills led to further improved preventive, curative services and breeding efficiency. The work of the TVWs has led to a fall in the proportion of dry and infertile milch animals: in Dediapada it fell from 329/1,000 in 1982-83 to 263/1,000 in 1984-85, while in Zankhvav it fell from 260/1,000 to 213/1,000. Anyone familiar with the situation will appreciate the degree of skill required of the TVWs, and acquired by them, in dealing with those animals that persistently do not come into heat. Their acquired skills are also demonstrated by the fall in mortality rates effected through a well-planned vaccination programme.

This "productive" educational process has had a definite impact on the total set of relations that make up the economic, cultural and symbolic universe of the tribal community. As pointed out in our discussion of technology, there has been a fairly high degree of adoption and integration of the new technology in the life of this community. This technology acceptance has had two signal effects.

It has generated a more rational attitude to the problem of sickness. An animal's sickness is now discussed in terms of cause and effect, of diagnoses and appropriate medicines. This represents a quantum leap for a community often exploited by quack doctors and has important implications for attitudes to human health.

The technology acceptance has helped to integrate the community with the commercial mainstream. We are fully aware that this effect is laden with dangers, that basic attitudes of groupal welfare may break down into selfish individualism, that interdependence with nature may turn into a self-defeating exploitation of nature, and that a certain beautiful simplicity may turn into ugly consumerism. However, though these are real dangers, one must offset against them the alternative of leaving the tribals on anachronistic isolated "reservations". Turning one's back on technological change may be a subtle form of induced suicide. We believe that they can be helped to pass through a painful transition period in which the community both adapts and preserves its mores and norms. Here the NGDOs have a crucial role to play, a role outside SUMUL's scope for the obvious reason that SUMUL is a business organisation unconcerned with such issues.

In the end we should not evade a final reckoning. After all that has been said and written, is OF in itself a beneficial development programme for the tribals ? The answer is in the negative. In the absence of supportive action by other agencies (NGDOs), OF shows a lack of concern for the long-term development of tribal Milk Producers' Cooperatives (MPCs). The emphasis of SUMUL and OF on processing and marketing is at the cost of satisfying the real needs of tribal MPCs: education in, and management of, animal health, development of alternatives for raising the nutritional standard of the herd, and flexibility in accommodating other types of organisation within the Anand pattern. This organisational problem is most acute in the case of individuals struggling with fodder shortage and calf care. Insistence on individual ownership is an obstacle in the way of solving these difficulties on a common basis. As far as equity is concerned, dairy farming does not really

affect the *poorest* sections of the tribal community. This is not to say, however, that the tribal community as a whole does not benefit. The case of Zankhvav proves conclusively that 80-85 per cent of tribals do benefit from this programme. The point that the community as a whole benefits is crucial in a context in which this community, as a whole, is being systematically excluded from the growth process taking place in that region. The failure of OF is more painful because of the potential left untapped in a situation where other development alternatives are hardly available.

While the role of the NGDOs has been generally positive, there are important limitations that, in all fairness, need to be mentioned. The decentralised and extensive model has not succeeded. It has helped only a small section, and it has perhaps raised exaggerated expectations for many who will not be able to continue in the programme. At a more fundamental level, the NGDOs have not yet succeeded in making the power of these and other tribal cooperatives be felt at the highest level of the cooperative structure: the Union Dairy. Until this happens the tribal MPCs will not be able to reap their rightful benefits from OF.

References

Acharya, K.T. and V.K. Huria. 1980. "Dairy Development in India: Some Critical Issues," *Economic and Political Weekly*, Nov. 8-15, pp.1931-1942.

——. 1986."Rural Poverty and Operation Flood," *Economic and Political Weekly*, September 13, pp.1651- 1656.

Agarwal, A. and S. Narain. 1989. *Towards Green Villages*. Delhi: Centre for Science and Environment.

Anand, J. and M. Savara. 1985. "Operation Flood in Surat District," in Claude Alvares ed. *Another Revolution Fails*, Delhi: Ajanta Publications pp.133-158.

Anthony, R.N. 1965 "Characteristics of Management Control Systems," from *Management Control System: Cases and Reading*, Illinois: IRWIN.

Bandyopadhyay, D. 1988. "Direct Intervention Programmes for Poverty Alleviation: An Appraisal," *Economic and Political Weekly*, (June 25), A.77-A.88.

Bank of India 1981. "An Evaluation Study of Dairy Scheme for Tribals in Gujarat," *Bank of India*, Bombay: Economic Intelligence and Planning Department.

Bardhan, P.C. 1987. "EEC Consultants" Report on Operation Flood," *Economic and Political Weekly*, (August 22), pp.1465-1466.

Baviskar, B.S. 1986. *Dairy Development in a Tribal Area in Gujarat*. Netherland: Institute of Social Studies.

----. 1988. "Dairy Co-operatives and Rural Development in Gujarat." pp.345-361, in D.W. Attwood and B.S. Baviskar eds. *Who Shares? Co-operatives and Rural Developement.* New Delhi: Oxford University Press.

Baviskar B.S. and S. George. 1985. "Milk Surpluses against Poverty—Report of an International Workshop," *Economic and Political Weekly,* (Sept.14), pp.1549-1551.

----. 1988. "Development and Controversy." *Economic and Political Weekly,* March 26, pp.A.37-A.38.

Behavioural Science Centre. 1980-81. *An Evaluation Report of Tribal Dairy Co-operatives in South Gujarat.* Mimeo, Ahmedabad.

----. 1982-83. *Annual Report.* Mimeo, Ahmedabad.

----. 1984. *Annual Report.* Mimeo, Ahmedabad.

----. 1985-87. *Annual Report,* Mimeo, Ahmedabad.

Beteille, A. 1969 *Caste, Class and Power.* Bombay: Oxford University Press.

Bowonder, B. et al. 1987. "Further Evidence on the Impact of Dairy Development Programme," *Economic and Political Weekly,* (March 28), pp.A.6-A.15.

Breman J. 1979. *Patronage and Exploitation,* New Delhi: Manohar.

----. 1985. *Of Peasants, Migrants and Pupers.* Bombay: Oxford University Press.

Crotty, R.M. 1980 *Cattle, Economic and Development,* New Delhi: Oxford and IBH. Commonwealth Agricultural Bureau.

Damodaran, A. 1987. "Structural Dimensions of Fodder Crisis," *Economic and Political Weekly,* March 28, pp.A.16-A.22.

Desai, I.P. 1984. Should 'Caste' be the Basis for Recognising Backwardness?" *Economic and Political Weekly,* July 14, pp.1106-1116.

Dharm, Narain 1977 "Growth of Productivity in Indian Agriculture," *Indian Journal of Agricultural Economics,* Vol.32(1), pp.1-44.

Dogra, B. 1985. "Operation Flood and the Rural Poor," in C. Alvares ed. *Another Revolution Fails.* New Delhi: Ajanta, pp.99-112.

Doornobs, M. et al. 1985.*Operation Flood as a Food Strategy: Socio Economic Implications and Issues for Research.* The Hague: Institute of Social Studies.

Dorsten, V.F. 1985. *The Rural Impact of Operation Flood: View Points and Hypothesis.* The Hague: Institute of Social Studies.

Fellowship Programme in Social Management, 1982. "A Study of Tribal Exploitation through Milk Cooperatives," Mimeo.

Fernandes W. 1984. "Some Dilemmas Facing Action Groups: Reaction from Activists," *Social Action,* (April-June), pp.197-215.

Franco, F. 1988. "The Structural Nature of Poverty in India," in J. Murickan, ed. *Poverty in India.* Bangalore: Xavier Board of Higher Education. pp.37-85.

Gaikwad, V.R. 1972 "A Search for the Rural Consumer," in *New Opportunities in Changing Agriculture,* pp.159-172. Ahmedabad: CMA (IIMA).

George, J. 1986. "White Revolution in India: Myth or Reality," *Economic and Political Weekly,* (December 6), pp.2147-2150.

George, S. 1985.*Operation Flood.* Delhi: Oxford University Press.

-----. "Faulty Lactometers," *Economic and Political Weekly,* (May 31 and June 7), pp.963-971 and pp.1020-1028.

-----. 1987. "Stemming Operation Flood: Towards an Alternative Dairy Policy for India," *Economic and Political Weekly,* (Sept. 26), pp.1654-1663.

-----. 1988. "Co-operatives and Indian Dairy Policy: More Anand than Pattern." in D.W. Attwood and B.S. Baviskar eds. *Who Shares? Co-operatives and Rural Development,* New Delhi: Oxford University Press. pp.394-420.

Guha, H. 1980 "Operation Flood: Some Constraints and Implications: A Comment," *Economic and Political Weekly,* (April 26), pp.795,796.

Gurucharan and B. Dogra. 1985. "Dairy Farmers Speak," in C. Alvares ed, *Another Revolution Fails.* New Delhi: Ajanta. pp.113-132.

Harris, C.C. 1980. *Fundamental Concepts and the Sociological Enterprise.* London: Goom Helm.

Heredero, J.M. 1977. *Rural Development and Social Change.* New Delhi: Manohar Publications.

——. 1983. "Milk Cooperatives and Tribal Poverty," *Social Action,* (July-September), pp.285-307.

——. 1989. *Education for Development.* New Delhi: Manohar Publications.

Imboden, N. 1985. *Managing Information for Rural Development Projects,* Dialogue. New Delhi.

Indian Dairy Corporation (IDC) 1986.*Operation Flood: A Progress Report.* Baroda: IDC.

Javed, A., and M. Savara. 1985."Operation Flood in Surat District," in Alvares Claude Alvares ed. *Another Revolution Fails.* Delhi: Ajanta Publications. pp.133-158.

Jha, M. 1988. "Rural Marketing: Some Conceptual Issues," *Economic and Political Weekly,* (February 27), pp.M.8-M.16.

Khandwalla, P.N. 1988. *Social Development.* New Delhi: Sage Publications.

Mascarenhas, R.C. 1988.*A Strategy for Rural Development.* New Delhi: Sage Publications.

Mehta, P. 1988. "Organizing for Empowering the Poor," in P.N. Khandwalla ed, *Social Development.* New Delhi: Sage Publications. pp.174-185.

Merquior, J.G. 1986.*Western Marxism.* London: Granada Publishing Limited.

Merquior, J.G. 1987.*Foucault*, Londonn: Fontana.

Minhas, B.S. and A. Vaidyanathan. 1965. "Growth of Crop Output in India, 1951-54 to 1958-61: An Analysis of Component Elements," *Journal of Indian Society of Agricultural Statistics,* 17 (n.2), pp.230-252.

Mishra, S.N. 1978. *Livestock Planning in India.* New Delhi: Vikas Publishing House.

Nair, K.N. 1979 "Milk Production in Kerala: Trends and Prospects," *Economic and Political Weekly,* (March 24-31), pp.A.25-A.39.

——. 1980 "Operation Flood: Some Constraints and Implications," *Economic and Political Weekly,* (Feb.23), pp.446- 448.

——. 1982. "Technological Change in Milk Production," *Economic and Political Weekly,* (March 27), pp.A.15-A.20.

——. 1985. "White Revolution in India: Facts and Issues," *Economic and Political Weekly*, (June 22-29), pp.A.89-A.95.

Nair K.N. and M.G. Jackson. 1981. "Alternative to Operation Flood-II Strategy," *Economic and Political Weekly,* (December 26), pp.2129-2132.

National Dairy Development Board (NDDB) 1978 *Operation Flood-II:* A Proposal. Anand.

——. *Milk Procurement and Technical Inputs Manual.* Anand.

Patel, N.R. 1979 "Management Information System: What they are and what they are not." Mimeo. IIM.

Patnaik, U. 1980 "Empirical Identification of Peasant Class Revisited," *Economic and Political Weekly,* (March 1), pp.483- 488.

——. 1987.*Peasant Class Differentiation.* Delhi: Oxford University Press.

Rajapurohit, A.R. 1979. "Cross-breeding of Indian Cattle: An Evaluation," *Economic and Political Weekly,* (March 24-31), pp.A.9-A.24.

Randeria, S. 1987. "Operation Flood: EEC Report Vindicates Critics," *Economic and Political Weekly,* (June 20), pp.977-978.

Sambrani, S. 1981.*Transforming the Rural Poor: The Big Push in Action, The Experience of Operation Flood.* Anand: IRMA.

Seetharaman and Mohanan 1986. *Framework for Studying Co-operative Organization.* New Delhi: Oxford and IBH Publishing Co.

Sen, H. 1988. "Class and Gender in Work Time Allocation," *Economic and Political Weekly,* (August 13), pp.1702-1706.

Shah, D. 1986. *The Gujarat Milk Marketing Federation: An Appraisal of its Functioning and Organisation.* The Hague: Institute of Social Studies.

Shah, T. and M. Bhargava. 1982. *Impact of India" s Dairy Co-operatives: Analysis Based on an in-depth study of Six Villages in the Districts of Sabarkantha (Gujarat), Peryar (Tamil Nadu) and Bikaner (Rajasthan),* Anand: IRMA.

Shah, T., A.K. Tripathy, and M. Desai. 1980 "Impact of Increased Dairy Productivity of Farmers' Use of Foodstuffs," *Economic and Political Weekly,* (August 16), pp.1407-1412.

Shah, V.P. 1981.*Role of Milk Co-operatives in Articulating Rural Urban Interactions: Experience in Gujarat - India,* Ahmedabad.

Singh, S. 1979 "Operation Flood II: Constraints and Implications," *Economic and Political Weekly,* (Oct. 27), pp.1765- 1776.

Singh, S.P. and P.L. Kelley. 1981.*Amul: An Experiment in Rural Economic Development.* New Delhi: Macmillan India Ltd.

Singh, S., and R.K. Sharma 1981. "Some Implications of Area Choice in the Operation Flood-II Programme," *Economic and Political Weekly,* (March 28), p.A.15- A.28.

Singh, S., and K. Singh. 1985. "Import of Donated Commodities, Export of Feed and New Technology of Milk Production," *Economic and Political Weekly,* (July 20), pp.1227- 1235.

Somjee, A.H. and G. Somjee 1974. "Co-operative Dairying and the Profiles of Social Change in India," Paper presented by Dr. and Mrs .Samjee at the XIX International Dairy Congress held in Delhi in Dec. 1974.

Dairy Cooperatives: A Catalyst for Economic and Social Change in Rural India, mimeo. Anand: NDDB.

Sundarayya, P. 1976. *The Land Question,* All-India Kisan Sabha.

Tata 1988.*Statistical Outline of India, 1988-89.* Bombay: Tata Services Limited.

Terhal, P. 1986. *Dairy Aid and Dependeancy: The Case of Operation Flood.* The Hague: Institute of Social Studies.

Verhagen, M. 1986. *Dairy Development and the Rural Poor: The Role of NGDOs.* The Hague: Institute of Social Studies.

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